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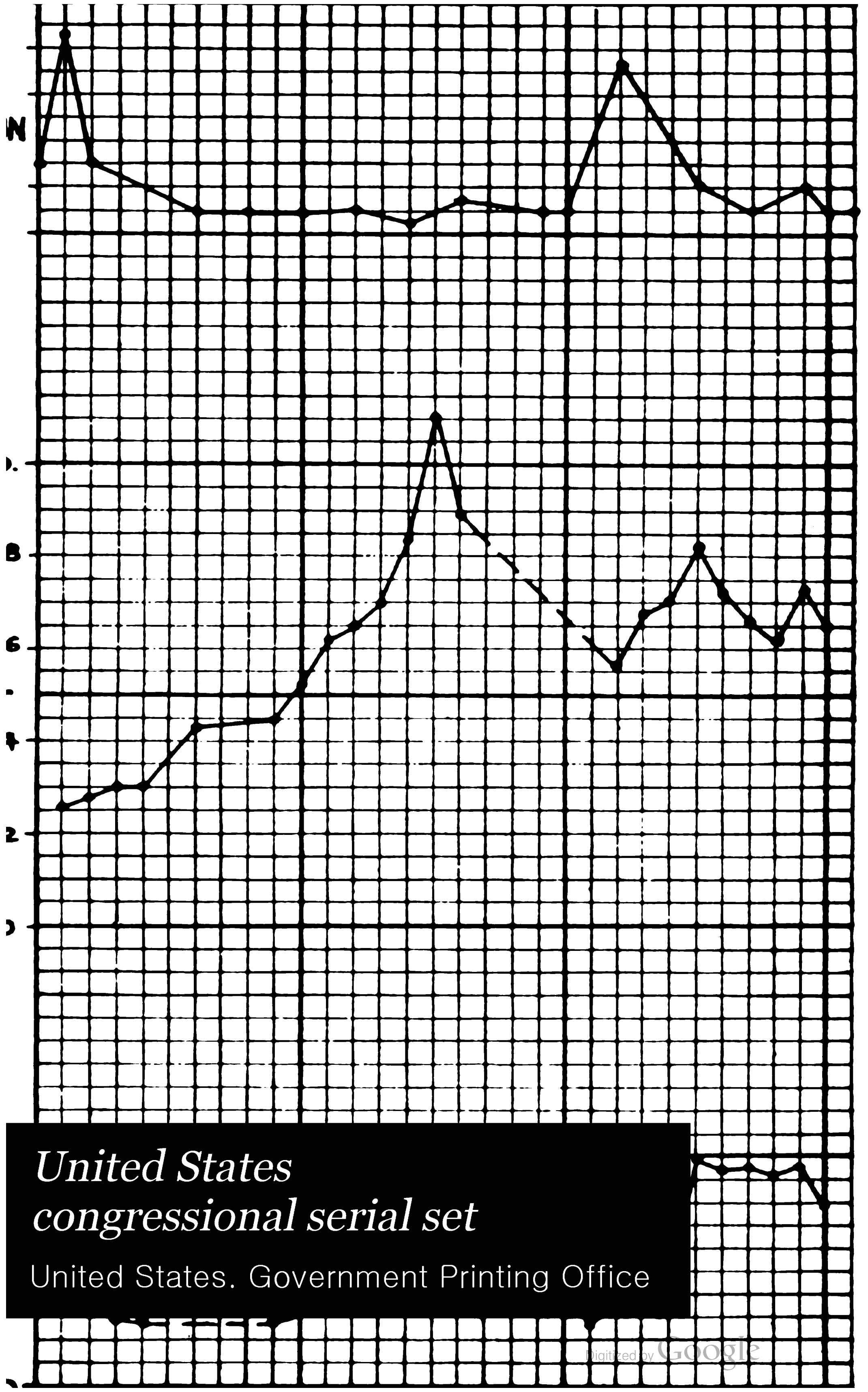

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3d Session. } { No. 1116.

WATERWAYS FROM LOUISVILLE TO SAVANNAH, GA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF WATERWAYS FROM LOUISVILLE TO SAVANNAH, GA., INCLUDING CUT-OFF OR CANAL FROM OGEECHEE RIVER TO SAVANNAH RIVER OR HARBOR, WITH A VIEW TO PROVIDING A MORE DIRECT ROUTE BETWEEN SAID CITIES THAN THAT AFFORDED BY EXISTING CHANNELS.

December 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed with illustrations.

War Department,
Washington, December 7, 1912.

Sir: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 11th ultimo, together with copy of a report from Col. Dan C. Kingman, Corps of Engineers, dated November 10, 1910, on preliminary examination of waterways from Louisville to Savannah, Ga., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, November 11, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of waterways from Louisville to Savannah, Ga.

1. There is submitted herewith, for transmission to Congress, report dated November 10, 1910, by Col. Dan C. Kingman, Corps of

Engineers, on preliminary examination authorized by the following provision of the river and harbor act approved June 25, 1910: "Waterways from Louisville to Savannah, Ga., including cut-off or canal from Ogeechee River to Savannah River or Harbor, with a view to providing a more direct route between said cities than that afforded by existing channels."

2. The existing water route from Louisville to Savannah is via the Ogeechee River from Louisville to its junction with the inland waterway between Savannah and Fernandina, a distance of about 196 miles; thence to Savannah by the inland waterway, a further distance of about 35 miles. The distance from Savannah to the Ogeechee River could be shortened about 50 miles by the use of the existing Savannah and Ogeechee Canal, 16 miles long, which connects Savannah with the Ogeechee River about 37 miles above its mouth. A charter was granted this canal in 1824 and construction was completed about 1830. It was operated for some 50 years, and as late as 20 years ago the eastern end was in use, but it has since been abandoned, and it is now badly obstructed by bridges, embankments, and other structures and would have to be entirely rehabilitated to make it serviceable.

3. There is at present no commerce on the Ogeechee River, as in its present condition it is not susceptible of useful navigation. The district officer, who is also the division engineer, is of opinion that if the State of Georgia would restore the existing canal to usefulness and maintain it free of all tolls the United States might be justified in undertaking the improvement and maintenance of the navigability of the Ogeechee River; but that unless the State would at least take possession of it, extinguish all adverse claims, and give it to the United States with all the rights that were enjoyed by the original grantees the United States should have nothing to do with the canal.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated March 6, 1911. The board is of opinion, in view of the great amount of work which would be necessary to make the canal navigable, that even if all rights thereto were ceded to the United States it would be inadvisable for the United States to take possession of it. The board is therefore of the opinion that under existing conditions the United States would not be justified in improving this waterway.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of the waterway from Louisville to Savannah, Ga., by rehabilitation of the existing Savannah and Ogeechee Canal, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

H. TAYLOR,
Lieut. Col., Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, March 6, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This is a report on preliminary examination of waterways from Louisville to Savannah, including cut-off or canal from Ogeechee River, to Savannah River or Harbor, with a view to providing a more direct route between said cities than that afforded by existing channels. The existing water route from Louisville to Savannah is via the Ogeechee River from Louisville to its junction with the inland waterway between Savannah and Fernandina, a distance of about 196 miles, thence to Savannah by the inland waterway, a further distance of about 35 miles.

3. The canal referred to connects Savannah with the Ogeechee River at a point about 31 miles above its mouth. The length of the canal is 16 miles, and the distance from Savannah to the Ogeechee River via the canal is about 50 miles shorter than by the present water route. This canal was built under a State charter issued in 1824 to the Savannah, Ogeechee & Altamaha Canal Co. There are six locks in the canal, varying in size from 101 feet long by 18 feet wide to 145 feet by 30 feet. Construction was completed about 1830. The canal was used up to the time of the Civil War, when it fell into disuse and has since been entirely abandoned as a water transportation route. It is now obstructed by bridges, embankments, and other structures, and it would have to be entirely rehabilitated to make it serviceable.

4. There is at present no commerce on the Ogeechee River, as in its present condition it is not susceptible of useful navigation. The commerce to be affected by the contemplated improvement is that tributary to the Ogeechee River, and the prospective commerce which might be created along the banks of the canal if it were restored to a navigable condition. The extent of this commerce is problematic.

5. The district officer, who is also division engineer, is of opinion that if the State of Georgia would restore this canal to usefulness and maintain it free of all tolls, the United States would be justified in undertaking to maintain the navigability of the Ogeechee River. He advises, however, that the United States should have nothing to do with the canal unless the State of Georgia would at least take possession of it, extinguish all adverse claims, and give it to the United States, with all the rights that were enjoyed by the original grantees. He recommends that for the present the United States take no further action.

6. The canal is now in an abandoned and useless condition. A great deal of work would be necessary to make it navigable. The dimensions of the locks as originally constructed are unsuited to the better type of river boats of to-day, and the canal would have to be practically reconstructed to meet the present demands of navigation. Even if all rights to the canal were ceded to the United States, the board believes that it would be inadvisable to take possession of it. It seems clear that under existing conditions the United States would

not be justified in improving this waterway, and therefore the board reports that it is not advisable for the General Government to undertake the work.

7. Interested parties were notified of the unfavorable report of the district officer and given an opportunity to present their views in regard to the questions involved to this board. One communication (not printed) bearing indirectly upon this subject has been received and given consideration. The board reports, in compliance with law, that there are no questions of terminal facilities, water power, or other subjects so related to the improvement contemplated as to render it advisable in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF WATERWAYS FROM LOUISVILLE TO SAVANNAH, GA.

United States Engineer Office,
Savannah, Ga., November 10, 1910.

Sir: 1. In obedience to instructions contained in department letter of August 4, 1910, I have the honor to submit the following report of a preliminary examination of waterways from Louisville to Savannah, including cut-off or canal from Ogeechee River to Savannah River or Harbor, with a view to providing a more direct route between said cities than that afforded by existing channels, as called for by the act of Congress approved June 25, 1910.

2. The act of March 3, 1909, called for an examination of the Ogeechee River. This examination was made and the report was published in House Document No. 681, Sixty-first Congress, second session. In this report the condition of the Ogeechee River from Louisville to its mouth was as well described as it can be without an actual survey, and allusion was made to the artificial connection which had existed between the Ogeechee River and the Savannah River at Savannah and known as the Ogeechee Canal. It was described in this report how this canal had been formerly constructed under charter from the State of Georgia, and for many years had been useful for commerce but how, in the period of the Civil War or the years that followed it, the canal had fallen into disuse and finally became unnavigable, its stock of little value, and it had passed into the control and part ownership of a railroad known as the Central of Georgia Railway Co., which parallels the Ogeechee River.

3. The present owners have made absolutely no effort to keep up the canal. The gates are gone from the locks, the banks are broken in many places, and the water is out of the canal except in such places as it stands naturally.

4. The original charter of the State carried with it valuable land grants and other privileges and was coupled with the provision that the canal should ever be maintained in a state fit for use. The present owners have violated this provision of their charter, and, in my opinion, have forfeited all that remains of the canal to the State.

5. In my former report I stated that if the State of Georgia would recover the canal and restore it to a usable condition it would, in my opinion, be advisable for the United States to undertake the improvement of the Ogeechee River, but that otherwise it would not be advisable.

6. The purpose of the present examination must be to develop something more in regard to this Ogeechee Canal, for the other portion of the route has been as well reconnoitered and described as it can be without a survey. I have accordingly had the canal examined by Assistant Engineer Lemen, and his report is transmitted herewith.

7. The canal is situated in the county of Chatham and State of Georgia. It was built about 80 years ago, and was operated extensively and profitably for many years, or up to the time of the Civil War. It is a summit-level canal, the water supply being from a small fresh-water stream known as the Little Ogeechee. It has six locks in all, though the two river locks were for guard purposes to keep flood water out of the canal. The length of the canal is 16 miles. The locks were constructed of brick, with wooden gates. They were about 18 feet wide and about 100 feet long. The canal appears to have been about 70 feet wide on the water surface and 5 or 6 feet deep. Since its abandonment it has been blocked by numerous obstructions. It is crossed by 14 railroads, 11 wagon bridges or embankments, 2 dams, and 3 conduits. The regulating works which control the summit level have been breached and destroyed. The canal shortens the distance from Louisville to Savannah about 50 miles and eliminates the tidal portion, where the currents are conflicting and where the water is often rough enough to be dangerous to small boats. The right of way of the canal was apparently from 150 to 200 feet.

8. If the canal were restored to its original condition it would, in my opinion, now be useful for navigation, would afford a water route for small boats suitable for the navigation of the Ogeechee River, and would enable farm and forest products to be brought cheaply to Savannah, which is the principal seaport of Georgia.

9. I am still of the opinion that if the State of Georgia would restore this canal to usefulness and maintain it free of all tolls the United States might well undertake to improve and maintain the navigability of the Ogeechee River. If the grantees have failed to comply with the conditions of their charter then it would seem that the canal was forfeited to the State of Georgia and that the State could recover it and nobody else could. I would not, under any circumstances, advise that the United States should have anything to do with this canal unless the State of Georgia would at least take possession of it, extinguish all adverse claims, and give it to the United States with all the rights that were enjoyed by the original grantees. In this case the United States might consider the advisability of rebuilding it, but I think that this would better be done by the State. In the meantime, I advise no further action on the part of the United States. I do not think that a survey of the canal would accomplish any useful purpose at this time, and a survey of the Ogeechee River was not considered necessary a year ago.

10. As this report is not regarded as an unfavorable one, no notices have been sent to parties at interest.

Very respectfully, your obedient servant,

DAN C. KINGMAN,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[For report of Board of Engineers for Rivers and Harbors, see p. 3.]

REPORT OF ASST. ENGINEER W. C. LEMEN.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., October 29, 1910.

COLONEL: 1. In compliance with your verbal orders of the 20th instant, I have the honor to submit the following report upon the preliminary examination of the old Ogeechee Canal.

2. This canal forms a link in the proposed waterway from Louisville, Ga., to Savannah, Ga., a preliminary examination and report of which is requested in the last river and harbor act.

3. The preliminary report upon the Ogeechee River, previously made, covers the portion of the route from Louisville, Ga. (196 miles from the mouth), to the western end of the canal, which leaves the Ogeechee River about 5 miles above the entrance of the Cannouchee River, or about 37 miles from the mouth of the Ogeechee River.

4. A portion of the map (not printed) of Chatham County, photographically reduced, accompanies this report, showing a general location of the canal.

HISTORY.

5. The Savannah & Ogeechee Canal was first proposed by Ebenezer Jenckes, who was granted a charter by the State legislature on December 20, 1824, to construct a canal from the Savannah River to the Ogeechee River. The company was capitalized at $199,225, under the name of the Savannah, Ogeechee & Altamaha Canal Co. The work dragged, and in 1828 the governor was authorized to subscribe $44,000, in the name of the State, to aid in the completion of the canal. In January, 1846, the concern was purchased by the Savannah & Ogeechee Canal Co. Capital, $160,000, in shares of $50 each. The canal was placed in good repair at that time, the company building two new locks, one at each end of the canal.

Extracts from the act incorporating the original company were transmitted with your report of August 3, 1909, upon the preliminary examination of the Ogeechee River.

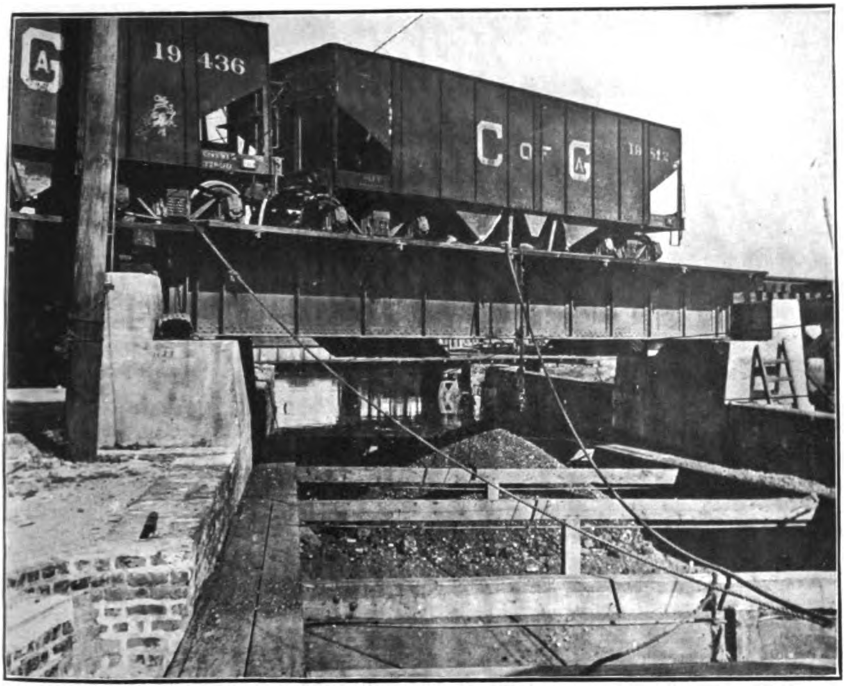
6. Some time after the Civil War the majority of the stock of the canal company passed into the control of the Central of Georgia Railroad, and this company allowed the canal to go into disuse, making no effort to maintain the same, as stipulated in the original grant of the State.

GENERAL LOCATION.

7. This canal, 16 miles in length, lies wholly within Chatham County, in the eastern corner of the State of Georgia. Connecting the Savannah and Ogeechee Rivers, it leaves the former about 18 miles from the coast at the upper limits of the city of Savannah and enters the Ogeechee River about 37 miles from where it enters the Ossabaw Sound.

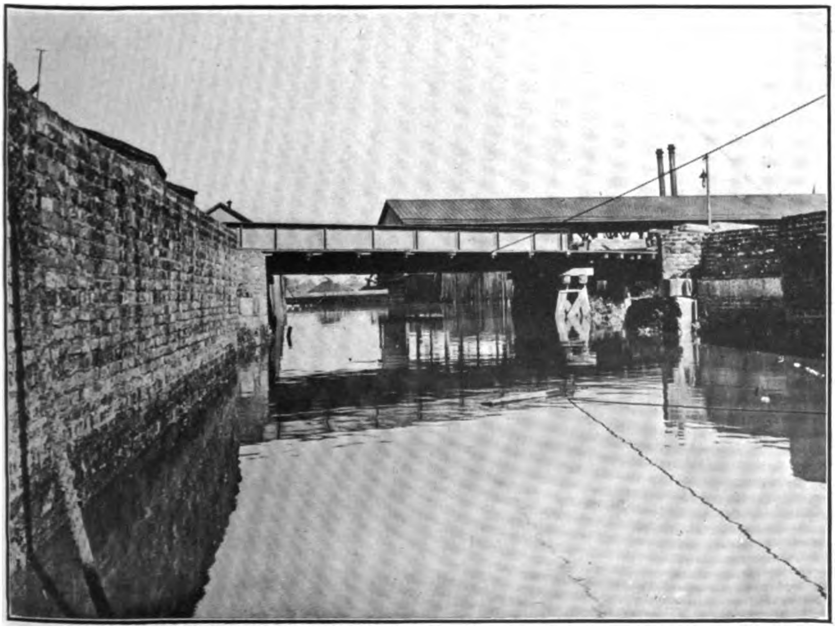
PHYSICAL CHARACTERISTICS.

8. Beginning at the eastern end the canal leaves the Savannah River at the lower end of the Central of Georgia Railroad terminals, about one-half mile from opposite the city hall of Savannah, and for the first 800 feet it is walled or bulkheaded down to a width of 30 feet, with a depth of 8 feet. This portion is used by the Central of Georgia Railroad for the loading of coal lighters for the supply of steamships. The method of using the canal for this is shown in the following view:



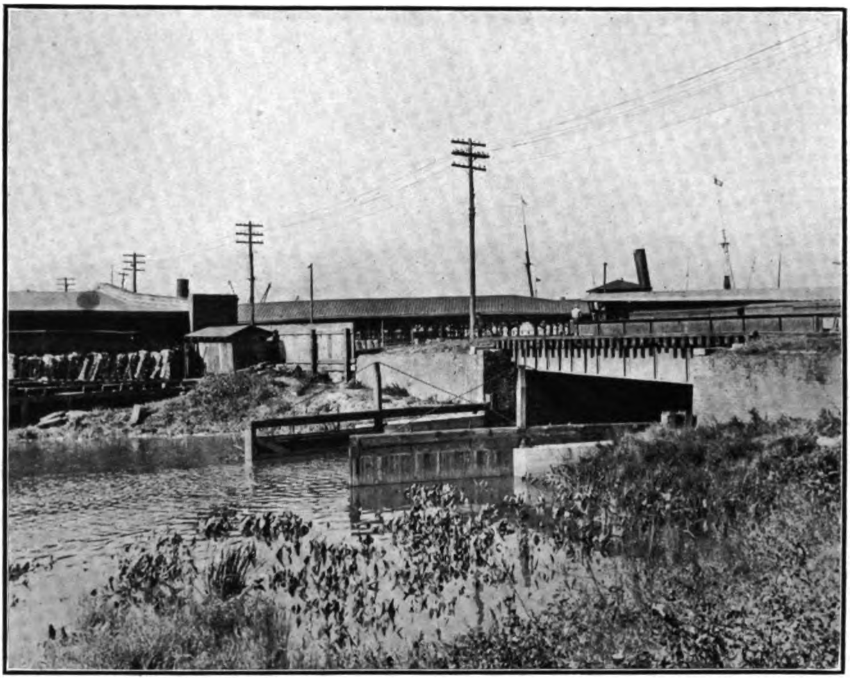
No. 1.

LOCK NO. 1, LOOKING TOWARDS RIVER, SHOWING METHOD OF LOADING COAL BARGES. THE RECESS FOR OLD GATES SHOWN IN FOREGROUND.



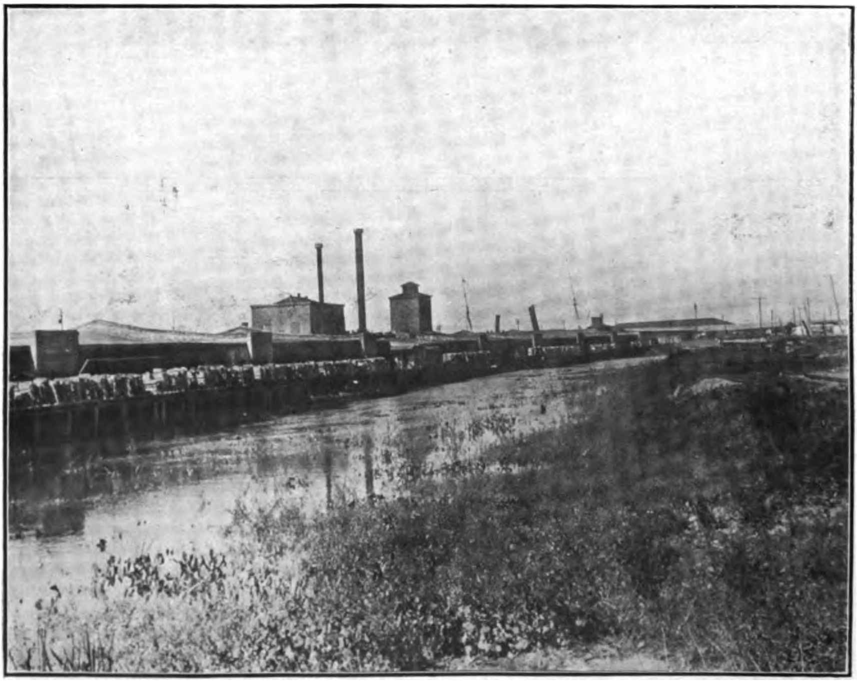
No. 2.

LOCK NO. 1 LOOKING TOWARD RIVER. SIDE WALL SHOWN IN FOREGROUND.



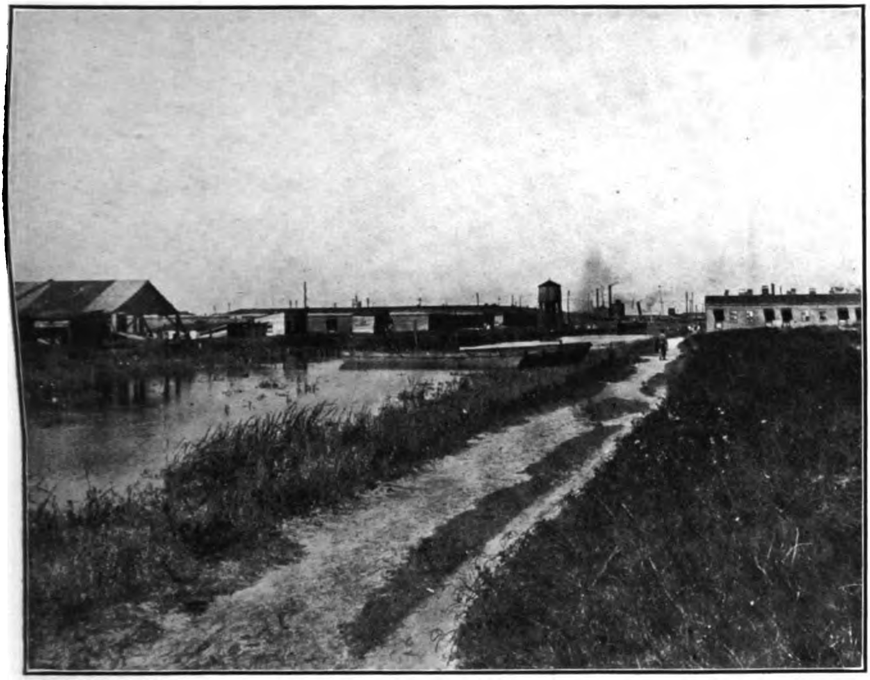
No. 3.

SHOWING TEMPORARY GATES AT END OF LOCK NO. 1.



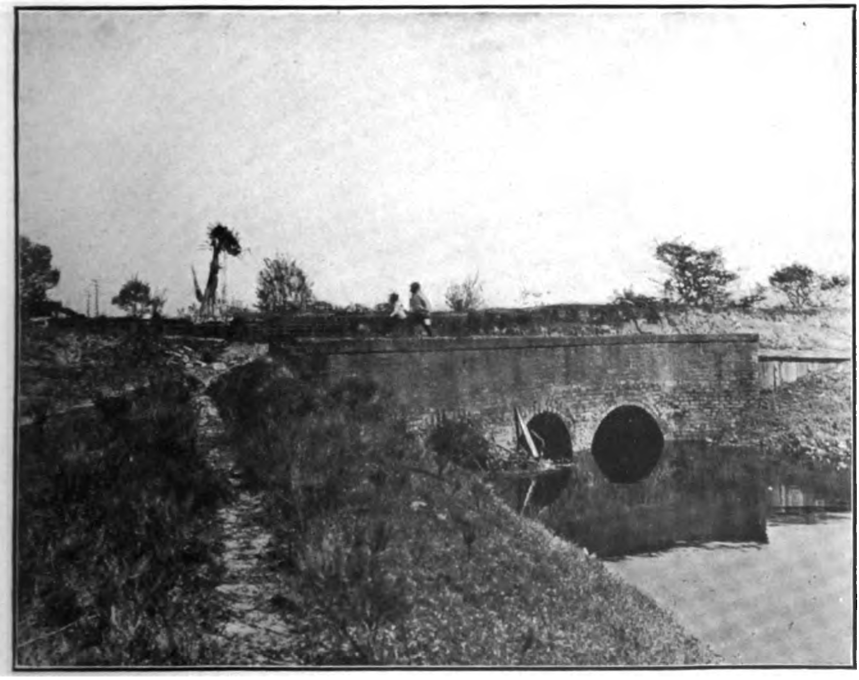
No. 4.

FROM EAST END OF BAY STREET BRIDGE, LOOKING NORTHEAST.



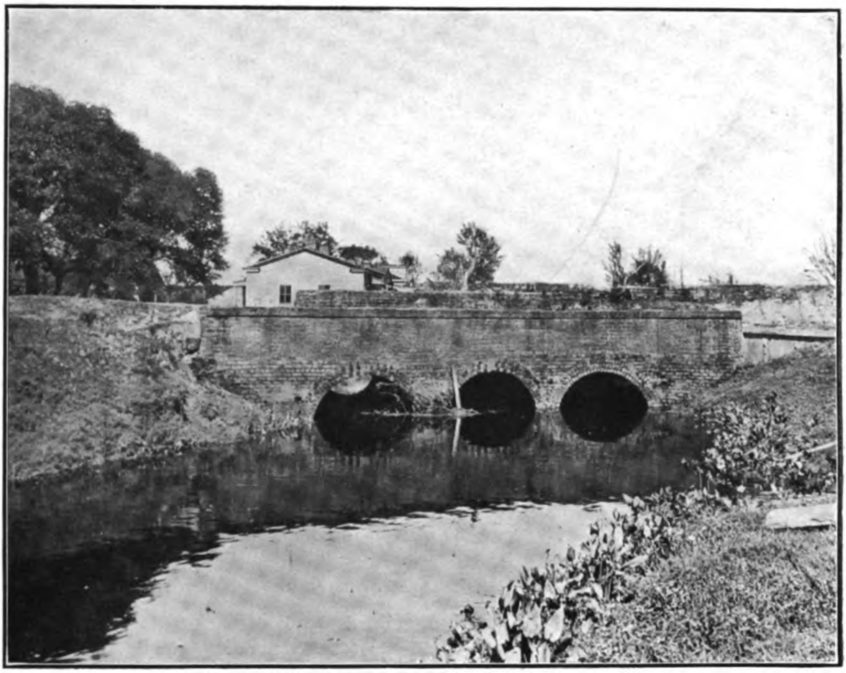
No. 5.

BAY STREET BRIDGE CROSSING SHOWN IN BACKGROUND.

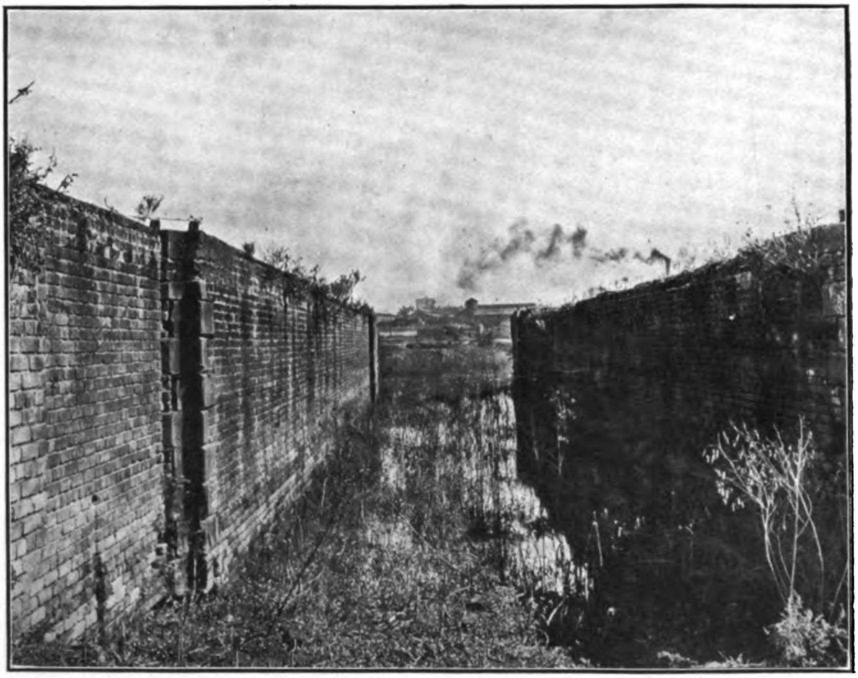


No. 6.

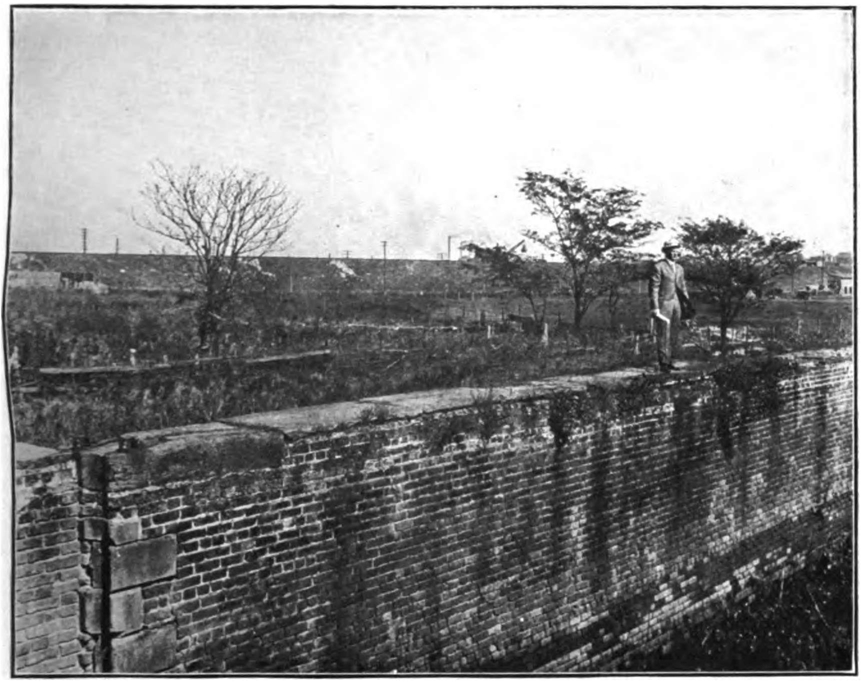
SPRINGFIELD DRAINAGE CANAL CONDUIT UNDER OGEECHEE CANAL.



No. 7.
SPRINGFIELD DRAINAGE CANAL CONDUIT. BRICK WALL OF LOCK IN BACKGROUND



No. 8.
SHOWING WALLS OF LOCK NO. 2, LOOKING TOWARD CITY.



No. 9.

SHOWING NORTH WALL OF LOCK NO. 2, ILLUSTRATING GENERAL CONDITION OF ALL LOCK WALLS.

No. 10.

LOOKING WEST ALONG CANAL FROM LOCK NO. 2.

9. Here is located Lock No. 1, 145 feet long, 30 feet wide. Views Nos. 1 and 2 show the lock. The side walls of locks were of brick, laid in cement mortar, top width of 2 feet, and in case of this lock are in very good condition. The gates, now gone, were of wood.

10. Across the canal, in this first 800 feet, there are four railroad bridges and one wagon bridge, with a clearance of from 8 to 14 feet at high water. The rise and fall of the tide is about 6 feet.

11. On the west side of River Street, at the end of the tail wall, there has been constructed a temporary wooden gate for the control of the tidal water in the canal for use in the terminal warehouses and shops of the Central of Georgia Railroad. A view of these gates is shown below in No. 3.

12. From the west side of River Street to Bay Street, about 1,500 feet, the canal has a top width of 150 feet with the east bank formed by the street and the west by the warehouse bulkhead. View No. 4 shows this portion of the canal.

13. From Bay Street to Railroad Street, about 3,000 feet, the top width is 100 feet, partially bulkheaded but badly filled by débris from the adjacent land. Bay Street Bridge crosses the canal in this stretch, shown in the background of view No. 5.

14. Near Railroad Street the canal is crossed by two heavy brick railroad viaducts, having 47 feet spans and a clear height of 22 feet. On the east side of the first one is a small wagon bridge, between them there is a wagon bridge and a small embankment, and on the west side of the second one a street bridge, extension of Railroad Street. The bridges are very low.

15. From Railroad Street the canal turns and runs in a northwesterly direction. Within the next 1,000 feet, up to Lock No. 2, one low trestle and one small dam block the canal, and the banks are low and in a broken condition.

16. Lock No. 2 is 102 feet long by 18 feet wide, brick walls, with old wooden gates; the lift was about 3½ feet. Under the western end, the old Springfield Drainage Canal was carried by brick conduits. Views 6 and 7 show this conduit, with the walls of the locks in the background.

17. No. 8 and 9 show the construction and present condition of this lock. While the cement coping of the side walls is broken (see view 9), the main walls are in fairly good condition.

18. From the views of this lock can be gained an idea of the rest of the locks, as they are of the same size and practically in the same condition, with one exception, noted later.

19. From the Central of Georgia viaducts west the canal narrows down to a top width of about 75 feet, width of towpath 20 feet, mid depth 10½ feet. Leaving Lock No. 2, looking west, No. 10 shows the condition of the canal and the general shape of the cross section, and this is a fair sample of the rest of the canal.

20. Up to Lock No. 3, about 8½ miles from the Savannah River, the canal traverses a rather high section of land, being well-settled rural sections of the city, with the banks in good condition except at a few places where same have been cut by drains. Between the two locks the canal is crossed by eight railroads and road embankments, two railroad trestles, one highway bridge, four drains, and two conduits, the latter affording drainage for the adjacent swamps through which the canal passes.

21. Lock No. 3 is the summit lock on the eastern end of the canal. It is 101 feet long by 18 feet wide; walls in sound condition; lift about 2 feet.

22. For about 1 mile before reaching this lock the canal was found bank full of water; apparently from the way the water was being held this section was in good condition, though rather heavily overgrown with brush and small trees. One of the conduits for taking care of the drainage water is found in this stretch.

23. Leaving Lock No. 3, the canal passes through highlands for about 1 mile and enters what is known as Hardings Swamp. The surface water of this swamp was carried under the canal at the eastern edge by a brick conduit, now broken, and the banks are cut, allowing the water to flow across the canal. This drain has been temporarily bridged.

24. The Georgia Lumber Co. have entered the canal at the eastern end of the Harding Swamp with their tramroad and follow it to the Quacco Road, about 1½ miles. The roadbed of this tram was built by robbing the south embankment of the canal and has weakened the same considerably. A cross section at this

point shows top width 75 feet, bottom width 30 feet, mid depth about 7 feet. This road has probably caused the canal to fill more here than to the eastward.

25. The Quacco Road crosses the canal on an embankment about 11½ miles from Savannah River, and one-half mile beyond it the canal enters the Ogeechee Ponds, which are formed by the damming of the Little Ogeechee River. A passing or turning basin was constructed at this point and the canal embanked only on the south side to the Little Ogeechee River proper. Here were placed the controlling works for holding the proper height in the canal and in the supply basin. The levee across this bottom land is about 15 feet in height and in good condition. Near the river it has been partly carried away, probably when the controlling works were destroyed.

26. High land is found west of the Little Ogeechee River, fairly well cultivated, and in this portion the canal has kept its cross section fairly well, though somewhat overgrown with small pines.

27. Lock No. 4 is 2 miles farther on from the summit basin and is of the same size and style as Nos. 2 and 3, with a lift of about 2 feet. The north wall is badly cracked, having settled some, and the whole lock badly overgrown with brush.

28. From this lock to the Ogeechee River the canal passes through flat lowlands, covered with second growth of pine, with some few small farms. The River Road crosses about 3,000 feet from the river on an embankment.

29. Lock No. 5 was placed within one-half mile of the river, is 101 by 18 feet, with a lift of about 4 feet; the walls are in fair condition, and old gates are gone.

30. From Locks 5 to 6, which is within a few hundred feet of the Ogeechee River, the canal passes through the bottom lands and is subject to a rise and fall of the tide of about 4½ feet. Lock No. 6 was filled with water when examined, but appeared to be in very fair condition.

COMMERCIAL STATISTICS.

31. The future commerce that might be carried upon the canal would depend upon that which would be produced from the country served by the Ogeechee and Cannouchee Rivers. This would be supplemented considerably by that which could be developed along the immediate vicinity of the canal in the way of general farm products and truck gardening. The lands adjacent to the canal are well settled, of good agricultural class, and mostly under cultivation, excepting the few swamps, three in number, through which it passes. Cotton, corn, rice, potatoes, sugar cane, and truck gardening are the main products, with considerable timber in the lowlands of the swamps. Within the city limits a number of manufacturing plants are located along the canal. The prospective commerce for the Ogeechee and Cannouchee Rivers is very fully set forth in your report of August 3, 1909.

SUMMARY.

32. The Ogeechee Canal traverses Chatham County, Ga., in its most productive section. Built about 80 years ago, it was operated extensively and profitably for some 50 years, and even as late as 20 years ago the eastern end was in use. Three locks were used on each side of the summit, six in all, with a total lift of not over 8 feet, and a total length of canal of 16 miles. Since its abandonment it has been blocked by a number of obstructions, being crossed by 14 railroads, 11 wagon bridges or embankments, 2 dams, and 3 conduits. The summit feeder for the canal is formed by the Little Ogeechee River, about 3½ miles from the Great Ogeechee River, and has a drainage area of about 75 square miles above the crossing of the canal.

33. A rough estimate of the annual run-off from this drainage area would indicate that this stream would afford ample water for the operation of the canal, even though the locks be increased in size to 150 by 40 feet.

34. Connecting the Ogeechee River with the Savannah River, this canal forms a saving of 50 miles in a water route from the country adjacent to the Ogeechee River to the nearest seaport, viz, Savannah, with the further advantage of avoiding any large bodies, and the meeting of at least three reversals of the tide before reaching Savannah, that would delay the class of boats used in river navigation. It would appear, therefore, that any project for the establishment of a water route from Louisville, Ga., to Savannah, Ga., must depend entirely upon the reopening of this canal, that the same may be made profitable or economical. The use that the farms lying on either side of this

canal could make of it for a cheap and ready transportation of small truck gardening is incalculable.

35. The present physical condition of this canal is such as to make its restoration to its former condition a simple problem so far as the natural obstructions that may be encountered are concerned, namely, the removal of the grass, brush, and filling that has occurred.

36. The artificial obstructions, such as embankments now used by the highways and railroads, would necessitate the bridging of the canal at these points by the several municipalities or corporations interested. In all cases no expensive structures have been erected that would entail a very great loss of original expenditures. The trestles, three in number, are very plain, and the bridges are light, short-span, plate girder in the case of the railroads, and wooden-sill bridges for the highways. Most of the crossings have been made by the simple filling in of the canal over a small wooden culvert, the replacement of which by the proper swing or lift bridges would be no more than what should have been done originally. The county of Chatham could well afford to construct these bridges for their county roads, and the several railroads interested are well able to do the same. Only two heavy structures across the canal exist at present, viz, the brick viaducts carrying the main lines of the Central of Georgia Railroad. These have a clear span of 47 feet and height of 22 feet.

37. From all the information that could be obtained, the present right of way of the canal is about 120 feet for most of its length, and near the city from 150 to 200 feet. The controlling size of the old locks is 100 by 18 feet. This would seem to be too small for the proper size of the river crafts which would be operated upon the Ogeechee or Cannouchee Rivers. While the freight rates, at the time of the original operation of the canal, were such that a small boat could profitably be operated, at the present time, with the competition of railroads, it becomes necessary that a river steamer shall have a carrying capacity of at least 150 tons net, which requires a beam of from 30 to 35 feet, and length of 125 to 140 feet.

38. It would also seem essential that no transfer of freight be made necessary from the river boats, at the entrance to the canal, to smaller boats or lighters on account of the cost of such transfer. Therefore, in my judgment, the present cross section of the canal would have to be enlarged and the old locks reconstructed with greater capacity. The present right of way and cross section will allow of this being done within certain limits.

RECOMMENDATIONS.

39. The United States has no jurisdiction over the right of way of this canal at present, which nominally lies in the name of the Savannah & Ogeechee Canal Co., but it is probably owned by the Central of Georgia Railroad Co. It would appear that they have forfeited any claim to the same, since, in consideration of the liberal grants of land and tax exemptions, the original charter specified the maintenance of the canal forever. The canal company, having plainly failed to do this, doubtless the State of Georgia could claim all the property now owned by the Savannah & Ogeechee Canal Co.

40. If some assurance could be obtained that the State of Georgia would reclaim this property and turn the same over to the United States Government free of cost, then, in my opinion, the benefit derived from the restoring or rebuilding of the canal would be commensurate to the cost of the same. A further examination and study of the canal is therefore recommended.

41. In order to obtain the data, it would be necessary to make a complete topographic and hydrographic survey of the canal, including the drainage areas of the swamps and of the storage basin at the summit. The cost of such a survey would be about $60 per mile of canal, or $1,000 for the total length.

42. In the preparation of the photographic views of the canal and locks, I am indebted to E. C. Garvin, junior engineer.

Very respectfully, your obedient servant,

W. C. Lemen,
Assistant Engineer.

Col. Dan C. Kingman,
Corps of Engineers.

O

PONCHATOULA RIVER, LA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF PONCHATOULA RIVER, LA.

DECEMBER 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 7, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 4th ultimo, together with copy of a report from Lieut. Col. L. H. Beach, Corps of Engineers, dated January 26, 1912, on preliminary examination of Ponchatoula River, La., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 4, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Ponchatoula River, La.

1. There is submitted herewith, for transmission to Congress, report dated January 26, 1912, by Lieut. Col. L. H. Beach, Corps of Engineers, on preliminary examination of Ponchatoula River, La., authorized by the river and harbor act approved February 27, 1911.

2. This stream has been improved by the United States by removal of snags, overhanging trees, and similar obstructions, under appropriations for the Tickfaw River and tributaries. The improvement desired was stated to be the removal of water hyacinth so that

the smaller boats can ply without difficulty. The district officer reports that this improvement has been accomplished by the U. S. S. *Hyacinth*, and a small balance of the appropriation still remains with which any further obstructions of this nature that may develop in the stream can be removed. The district officer, therefore, believes that further action is unnecessary.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated February 26, 1912, concurring in the opinion expressed by the district officer who is also the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Ponchatoula River, La., further than as provided for under the existing project, is not deemed advisable at the present time.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 26, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The Ponchatoula River is a stream about 18 miles long, lying entirely in Tangipahoa Parish, La. It flows in a general southerly direction until within the last 5 miles of its course, where it turns more to the west and flows into the Natalbany. It is navigable to Wadesboro, a point about 5 miles above the mouth, and just above this place is crossed by a fixed bridge. The river has been improved by the removal of snags, overhanging trees, and similar obstructions, under appropriations for the Tickfaw River and tributaries, and it is stated that the improvement desired is the removal of the water hyacinth, so that the smaller boats can ply without difficulty. The district officer reports that this improvement was accomplished during the past season by the U. S. S. *Hyacinth*. A small balance of the appropriation still remains, and should any further obstructions develop in the stream they can be removed with the funds available.

.Under the circumstances it does not appear that any improvement of the locality is desired beyond that already authorized, and the district officer believes that further action is unnecessary. A statement of his conclusions was furnished interested parties with an invitation to submit their views on the matter to the board. No communications have been received by the board in reference to the subject. The board concurs with the district officer, who is also division engineer, in the opinion that the improvement of Ponchatoula River is not advisable to a greater extent than is now permissible under the project for the improvement of Tickfaw River and tributaries.

There are no questions of water power, terminal facilities, or other related subjects having any material bearing upon the question herein considered.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF PONCHATOULA RIVER, FLA.

United States Engineer Office,
New Orleans, La., January 26, 1912.

Sir: In compliance with department letter of April 7, 1911, I have to submit the following report concerning the preliminary examination of the Ponchatoula River, La., as directed by act of Congress approved February 27, 1911.

The Ponchatoula River is a stream about 18 miles long, lying entirely in Tangipahoa Parish, La., and flowing in a general southerly direction until within the last 5 miles of its course, when it turns more to the west and flows into the Natalbany. There are no towns, or even large villages upon the stream. It is navigable to Wadesboro, a point about 5 miles above the mouth. A fixed bridge crosses it just above this place, which has always been regarded as at the head of navigation.

A schooner plies weekly between New Orleans and Wadesboro, the route being across Lake Pontchartrain to the mouth of the Tickfaw River, up that stream to the mouth of the Natalbany River, and up the Natalbany to the mouth of the Ponchatoula River, thence up that stream to its destination. There are a few gasoline launches at Wadesboro which do some business in carrying goods locally along the stream.

The river has been improved by the removal of snags, overhanging trees, and similar obstructions, under appropriations for the Tickfaw River and tributaries. In response to the inquiries of parties interested in the stream development this office was informed that the desired improvement consisted in the removal of the water hyacinth, so that the smaller boats could ply without difficulty. This was accomplished during the past season by the U. S. S. *Hyacinth*. Some work was also done upon the Tickfaw and tributaries by the Government snagboat *Pearl*, borrowed for the purpose from the Mobile (Ala.) district. A small balance of the appropriation still remains, and should any further obstructions develop in the stream they can be removed with the funds available.

Under the circumstances it does not appear that any improvement of the locality is desired beyond that already authorized, and further action is therefore unnecessary.

Respectfully submitted.

Lansing H. Beach,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, United States Army.

[For report of the Board of Engineers for Rivers and Harbors, see page 2.]

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62D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1118.

GREEN RIVER NEAR ROCHESTER, KY.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF GREEN RIVER, KY., AT AND NEAR LOCK AND DAM NO. 3, NEAR ROCHESTER, WITH A VIEW TO THE DIVERSION OF THE WATERS OF MUD RIVER FROM ITS PRESENT MOUTH ABOVE THE SAID LOCK AND DAM TO A SUITABLE POINT BELOW.

DECEMBER 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 7, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 1st ultimo, together with copy of a report from Capt. Lytle Brown, Corps of Engineers, dated June 1, 1911, on preliminary examination of Green River, Ky., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 1, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Green River, Ky.

1. There is submitted herewith, for transmission to Congress, report dated June 1, 1911, by Capt. (now Maj.) Lytle Brown, Corps of

Engineers, on preliminary examination of Green River, Ky., at and near Lock and Dam No. 3, near Rochester, with a view to the diversion of the waters of Mud River from its present mouth above the said lock and dam to a suitable point below, authorized by the river and harbor act approved February 27, 1911.

2. The improvement desired is not in the interest of navigation but is for the amelioration of flood conditions. These conditions are not new. As stated by the district officer, they have obtained since the improvement of the Green River by the State of Kentucky some 80 years ago, but have been particularly destructive for several successive years. For the reasons stated in his report the district officer is of the opinion, which is concurred in by the division engineer, that it is not advisable for the United States to undertake this improvement at this time.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated February 26, 1912, concurring in the opinion expressed by the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Green River, Ky., at and near Lock and Dam No. 3, near Rochester, in the manner specified in the act is not deemed advisable at the present time.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 26, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

The object sought by this examination is clearly outlined by the wording of the act, which is as follows: "Green River, Ky., at and near Lock and Dam Numbered Three, near Rochester, with a view to the diversion of the waters of Mud River from its present mouth above the said lock and dam to a suitable point below."

The improvement desired is not in the interests of navigation, but is for the amelioration of flood conditions. Dam No. 3 of the Green River system pools Mud River for about 12 miles, giving it a navigable depth for about 8 miles. During periods of high water the low lands along this stream are flooded and the owners affected appear to hold the opinion that if the mouth of the Mud River were diverted from above to below Dam No. 3, relief would be obtained.

During moderate rises the effect of the improvement would probably be to lower the water surface somewhat, but its influence would be lessened as the stage increased and in times of extreme high water would scarcely be noticeable. Navigation on the Mud River at low and ordinary stages would be destroyed, and in order to prevent the draining of pool 3, Green River, a dam would have to be constructed between the present mouth of Mud River and the head of the diversion ditch. The conditions existing are not new, but as the district officer states, have obtained since the improvement of the Green River by the State some 80 years ago. It appears that for several successive years the waters have been high during the growing season, resulting in more or less loss.

General commerce and navigation would not be benefited by the improvement, and it is not believed that the work of flood control could be coordinated with that of navigation in such a way as to warrant the General Government in undertaking it. In view of the foregoing, the board concurs with the district officer and the division engineer in the opinion that the improvement contemplated in the act is not worthy of being undertaken by the General Government.

Interested parties were duly advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board. Several communications[1] have been received and given consideration. Hon. R. Y. Thomas, M. C., appeared before the board and stated that some of his constituents had informed him that the dam had been raised several feet in recent years, and that this was, in their opinion, the cause of the serious floods. At the request of the board this matter was investigated by the district officer, and it appears from maps and other data in the district office that the dam has not been raised as much as 6 inches since it came under the control of the United States.

There are no questions of terminal facilities or water power that have any bearing upon the improvement contemplated. The question of flood control is covered in detail within and referred to briefly above.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF GREEN RIVER, KY.

United States Engineer Office,
Louisville, Ky., June 1, 1911.

Sir: In accordance with the instructions contained in a letter from the office of the Chief of Engineers dated April 7, 1911, I have the honor to submit the following report of a preliminary examination of Green River, Ky., at and near Lock and Dam No. 3, near Rochester, with a view to the diversion of the waters of Mud River from its present mouth above the said lock and dam to a suitable point below, this as directed in the river and harbor act approved February 27, 1911.

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[1] Not printed.

A personal examination was made of the locality March 14, 1911, and a more extended examination May 24, 25, and 26, 1911, after a period of unusually high water.

Mud River empties into Green River about 500 feet above the dam at Lock No. 3 of the latter stream, and the pool water extends up the former stream about 12 miles at low water, rendering the stream navigable for barges and small steamers for about 8 miles from the mouth. The width of the stream is about 100 feet in this distance and its mean depth is about 5 feet. A great quantity of timber has been brought out on this stream in the past and a considerable amount is brought out in rafts at present, also a considerable quantity of crossties is brought out in barges. The stream is navigable in fact, but outside of the timber trade the commerce on Mud River is now negligible. However, there does exist within the reach of slack water some of the most valuable coal land in the Green River field.

The bottom lands of Mud River and its tributary creeks near Green River are low and begin to flood from backwater when the upper gauge on the said Lock No. 3 reads 16 feet. The spillway of the dam of this lock is contracted, and the landowners have come to the conclusion that their crop losses during the past three years are largely attributable to the conditions produced by the said dam. They have conceived the idea that if Mud River should be given an outlet below the dam that the headwater and the backwater would have a much quicker run-off and that damage to crops would be much reduced. The acreage that would be affected may be placed at 5,000 acres at a maximum, worth not to exceed $50 per acre.

The diversion as proposed would leave Mud River some 3 miles from its mouth, following the sinuosities of the stream, and proceed in a fairly straight line along a slight depression till it joins Green River about a mile below Lock No. 3, the total length of the diversion being about 1¼ miles. Such a diversion would doubtless destroy all navigation of Mud River now and in the future except the running of logs. As has been stated, the interests of navigation, outside of timber interests, are small in the stream at present. The transporting of coal by water out of Mud River seems to be a very improbable contingency in the near future, as no mines are being operated at all in the slack-water reach.

Should the proposed diversion ditch be made, it would be imperative to build in a most substantial and thorough manner a dam across Mud River some distance below the point of departure of the cut-off; else the pool of Dam No. 3, Green River, would furnish a large volume of water, which would eventually amount to a deflection of Green River through the cut-off, thus isolating Lock No. 3 and interrupting navigation on that stream. The expense of building this dam and maintaining it, of dredging the ditch and properly protecting its banks is thought to be such as to be far beyond the resources of the local interests to be benefited.

Much of the bottom land of Green River is subject to frequent flood, especially that land adjoining the foothills. The ground along the river banks is always higher than that some distance back from the river. This applies especially to pools Nos. 1, 2, and 3, Green River; No. 1, being 55 miles long; No. 2, 46 miles; and No. 3, 44 miles. During this examination the valley of Mud Creek, emptying into Green River some 9 miles above Mud River, was examined, and it is estimated that some 5,000 acres of land, worth not to exceed $30 per acre, here are subject to flood from backwater from Green River, the flooding beginning at a stage of 16 feet on the upper gauge at Lock No. 3. There is no doubt but that the dams on the river tend toward aggravating the floods on the bottom lands, but to what extent can not be determined with precision from the data at hand. It is assumed that for a gauge reading at Lock No. 3, upper gauge, backwater flooding of land begins at 16 feet, and that for stages between 16 and 22 feet the dam has a decided tendency to aggravate the backwater flooding. With this assumption the following table is made from the record of gauge readings. Flood waves in excess of 22 feet are regarded as being but little influenced in height by the dam.

Year.	Between 16 and 22 feet.		Above 22 feet.	
	Month.	Days.	Month.	Days.
1894	February	14		
1895	December	1		
1896	March	5	April	6
1897			February-March	6
Do			March	9
Do			April	5
1898	March	7	January	9
Do			March-April	4
1899	February	5	March	8
Do	May	5	....do	
1900			November-December	6
1901	April	3		
1902	....do	4	February	10
Do			December	10
1903	February	4	March	8
Do	June	5		
1904	March-April	9		
1905	March	4	December	6
Do			March	6
1906	March-April	8	November	7
Do	December	6		
1907	February-March	12	January	7
Do	March	4		
Do	May	5		
1908	February	7		
Do	April	2		
1909	February	5	March	13
Do	July	2		
1910	February	7		
Do	April	6		
Do	May	2		
Do	June	4		

Rises which occur between March and December are the ones that cause damage to river-bottom lands. Other rises are beneficial rather than detrimental. From the above table it may be seen that in the years 1894–1910, inclusive, there have occurred 12 periods of high water destructive to crops; of these 12, nine were probably largely influenced by the dam at Lock No. 3.

In general it may be stated that the cultivation of the river bottom in this region will be of greater importance in the future than it has been in the past. The timber interests have predominated in the past at the expense of the farming interests. Much of the hill land has been worn out by constant cultivation. However, there is a preponderance of uncultivated land not yet cleared, and the question of the cultivation of the lowest river land is not at all pressing.

The question of the diversion of Mud River is one of restricted local interest, as less than a dozen farms are involved. The question of floods on all the bottom lands of the three lower pools of Green River should, in my opinion, be considered before steps are taken toward the correction of conditions at any one locality by the special means proposed in this case. The desire to correct conditions in this locality arose from the fact that for three years in succession late rises have done much damage; these conditions were exceptional.

Lock and Dam No. 3, Green River, has been maintained at present dimensions and elevations for 80 years past. The dam is of the timber-crib work filled with stone on rock foundation; length of spillway, 353 feet; normal lift, 16.137 feet. The length of spillway is deficient for purposes of navigation, as considerable periods exist after the lock has been drowned when upstream navigation is difficult if not impossible. In the course of a few years this dam will require rebuilding, and that event is the proper time for the consideration of measures to be taken for the amelioration of flood conditions, not only in the valley of Mud River but also in the whole of the pool produced by the dam.

I recommend that no steps be taken at present toward the diversion of Mud River, but that in the future reconstruction of timber dams on Green River the advisability of concrete dams each with a movable crest some 6 feet high be considered.

The questions of water power and terminal facilities have no bearing in this examination but the former will receive some attention in case the dam is lowered and a movable crest inserted.

There are appended letters[1] from interested parties.

Respectfully submitted.

LYTLE BROWN,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF DIVISION ENGINEER, CENTRAL DIVISION,
Pittsburgh, Pa., June 3, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer that this locality is not worthy of improvement by the General Government at the present time.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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[1] Not printed.

COVE HARBOR, CONN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF COVE HARBOR, CONN., WITH A VIEW TO PROVIDING AN ENTRANCE CHANNEL OF INCREASED DEPTH.

DECEMBER 10, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 7, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated October 21, 1912, together with copy of a report from Lieut. Col. Harry Taylor, Corps of Engineers, dated November 5, 1910, on preliminary examination of Cove Harbor, Conn., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 21, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Cove Harbor, Conn.

1. There is submitted herewith, for transmission to Congress, report dated November 5, 1910, by Lieut. Col. Harry Taylor, Corps of Engineers, on preliminary examination of Cove Harbor, Conn., with a view to providing an entrance channel of increased depth, called for by the river and harbor act approved June 25, 1910.

2. The district officer reports that the improvement of the locality is not worthy of being undertaken and does not recommend a survey for the reason that it would not be of general benefit to navigation nor to the community, except in so far as it would enable one company to obtain its raw materials at cheaper rates than it now procures them. The division engineer, however, believing that other matters should also be considered, recommends that a survey be made to determine the necessity of the desired improvement.

3. The Board of Engineers for Rivers and Harbors has reviewed this report, as required by law, having held a public hearing at which the president of the company directly interested appeared in behalf of the improvement, and the board's conclusion is that general commerce and navigation would not be benefited to an extent sufficient to justify the United States in entering upon the desired improvement.

4. After due consideration of the above-mentioned report, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Cove Harbor, Conn., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Edw. Burr,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, December 20, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

This is a small tidal inlet, located about 1 mile westward of Long Neck Point and about 2 miles eastward of Stamford Harbor. At the head of the cove are located the works of the Stamford Manufacturing Co., engaged in the manufacture of logwood and other dyewood extracts on an extensive scale. In its natural condition the cove was very shallow, having depths of 1 to 4 feet, but through expenditures made by the company above referred to the depth has been increased in the upper part of the harbor to about 9 feet at mean low water, which appears to be about 1 foot greater than the depth over the bar at the entrance.

The Stamford Manufacturing Co. brings in its raw material and ships its finished product by water, and it is stated that this commerce averages about 50,000 tons per year. This firm is the only one using the harbor for commercial purposes.

The improvement desired is a straighter and deeper entrance channel over the bar, so as to permit vessels drawing approximately 20 feet to enter at high tide. The company proposes to provide a similar depth to its wharves within the harbor. The range of tide is about 7 feet.

The district officer states that in his opinion the improvement is not worthy of being undertaken by the General Government, for the reason that one company only is concerned in the improvement; that it is not of general benefit to navigation nor the community except in so far as it would enable the Stamford Manufacturing Co. to obtain its raw materials at cheaper rates than it now obtains them. The division engineer is not in accord with the views of the district officer, and he recommends a survey to determine whether the improvement should be regarded as meritorious.

In response to the district officers' notification of his unfavorable report, request was made for a hearing before the board, which was granted, and on December 13, Mr. W. W. Skiddy, president of the Stamford Manufacturing Co., appeared in behalf of the improvement. Mr. Skiddy stated in effect that his company is willing to cooperate in the improvement and that what he particularly desires is a survey and plan prepared by the General Government outlining the character of improvement best adapted to the locality. Under existing law a survey can not be made without the further direction of Congress unless the locality is deemed worthy of improvement or a survey is necessary to determine the question of advisability.

In the present case the board is inclined to concur in the views of the district officer to the effect that general commerce and navigation would not be benefited to an extent sufficient to justify the United States in entering upon this improvement, and therefore it can not recommend that a survey be made at the expense of the General Government.

The district officer describes existing wharves and terminal facilities, and attention is respectfully invited to his remarks on this subject. In compliance with the provisions of section 3 of the act of June 25, 1910, the board reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF COVE HARBOR, CONN.

United States Engineer Office,
New London, Conn., November 5, 1910.

Sir: I have the honor to submit the following report of a preliminary examination of Cove Harbor, with a view to providing an entrance channel of increased depth in compliance with the requirements of the act of Congress approved June 25, 1910.

Cove Harbor, Conn., is a small tidal inlet located about 1 mile westward of Long Neck Point and about 2 miles eastward of Stamford Harbor, at the head of and in about the center of a broad bay formed between Shippan Point and Long Neck Point. The locality is shown on United States Coast and Geodetic Survey Chart No. 268. Depth of about 9 feet at mean low water can be carried through the bay to the entrance of the harbor, although the channel is somewhat tortuous. From the 6-foot curve in the bay to the head of the harbor the distance is about one-half mile, and in this distance the original depths, according to the Coast and Geodetic Survey chart referred to, were from about one-half foot to 4 feet, but for the most part about 1 foot. The original width in the harbor between high-water line on either side was 250 to 500 feet, averaging about 350 feet. The mean rise and fall of tide at Stamford Harbor, the nearest locality at which it is known, is 7.3 feet, and at Cove Harbor it is probably about the same. The harbor is connected at its head with Holly Pond by an old mill race, which was formerly used to a considerable extent for furnishing power, but which is very little if any used at present.

At the head of the harbor, and between it and Holly Pond, are located the works of the Stamford Manufacturing Co., a concern which was established in 1796 and incorporated in 1844. The business of this company is the manufacture of logwood and other dyewood extracts, and quebracho and other tanning extracts. This concern is the only one using this harbor for commercial purposes, but by them it is used to a large extent, as they depend entirely upon water transportation for receiving raw materials and shipping their manufactured goods. The nearest point that any railroad comes to the works of the Stamford Manufacturing Co. is about 1¼ miles in a straight line, and the nearest railroad yards and freight houses are at Stamford, about 2 miles distant. A trolley line runs near the head of the harbor, but this does not offer any facilities for transportation of freight.

Owing to the nature of its business, the Stamford Manufacturing Co. imports large quantities of quebracho wood from the Argentine Republic, and logwood, fustic, and other dyewoods from the West India Islands, Mexico, and Central America, and all of this material would be brought directly to the works of the company in deep draft seagoing vessels, both sail and steam, if the depths in the harbor were sufficient. But owing to the lack of depth at the entrance to the harbor, it is rare that large tramp steamers can be induced to enter it, and difficulty has also been found in obtaining sailing vessels with draft shoal enough, when loaded with a profitable sized cargo, to permit them to enter the harbor. Consequently it is frequently necessary to bring much of the imported wood to New York in deep draft vessels, and then transship it and bring it to the harbor in small steam lighters and barges, and for this service the company owns a steam lighter and several barges which run between New York and Cove Harbor, carrying freight in both directions. The figures given in the accompanying statement of the number of lighters, etc., entering the harbor represent largely the number of trips of these vessels—they do not represent the number of different vessels entering the harbor.

On September 12, 1910, the following vessels were found in the harbor:

Steel bark *Belmont*, of Nova Scotia, loaded with quebracho wood from Buenos Ayres, Argentine Republic. This vessel came in drawing 16 feet 5 inches, at an exceptionally high tide. She grounded on the bar at the entrance and had to wait over one tide. Her actual load was stated to be 1,150 tons of wood and 500 tons of ballast, but it was said she could have carried 2,000 tons of wood, but would then have drawn 19½ feet—too much to enter the harbor.

Barkentine *Hancock*, of New York, 412 tons gross, and 340 tons net, register. Loaded with 360 tons of logwood; drew 14 feet.

Three-master schooner *Herald*, of New York, 499 tons gross, and 474 tons net, register, loaded with 621 tons of logwood from Savanna-la-Mar, Jamaica. This vessel drew 16 feet when she entered the harbor.

A tabular statement giving data relative to the commerce of Cove Harbor, furnished by Mr. W. W. Skiddy, president of the Stamford Manufacturing Co., is forwarded herewith. A tabular statement furnished by the collector of customs, at Bridgeport, Conn., in which collection district this harbor is located, giving data in regard to the size and rig of vessels entering the harbor, and the value of the imports, is also farwarded. The statements of the collector of customs, and of Mr. Skiddy agree, except there is some discrepancy in regard to the rig of a number of vessels, but the total number of vessels reported is the same; although in the statement of the collector there is apparently one vessel omitted between September 25, 1905, and June 5, 1906, as the total given is 17 (which agrees with Mr. Skiddy's total for the same period), although only 16 vessels are included in the collector's statement.

According to Mr. Skiddy's figures, the total amount of freight shipped and received at Cove Harbor during the six years to June 30, 1910, amounted to 314,259 long tons. The average value of the imported woods is stated to be about $20 per ton, and the average value of the manufactured goods shipped, to be about $80 per ton, and estimating the value of the coal used at $4.25 per ton, it gives a total value of $3,052,445 for the goods received, and $6,017,760 for goods shipped, a total of $9,070,205, or an average of over $1,500,000 per year. The tonnage reported by Mr. Skiddy, which has averaged over 50,000 tons per year for the past six years, is about the same as the total amount of freight handled on the west branch of Stamford Harbor, but the value is nearly five times as much; the tonnage of Cove Harbor amounts to about 25 per cent of the tonnage of Norwalk Harbor, and the value to not far from three-fourths of the total value of the freight handled in that harbor; it is also much greater in value than the total value of the freight handled in Mill River, New Haven Harbor, although the tonnage is only one-sixth as much.

Mr Skiddy in transmitting the data states as follows:

> The total tons of raw materials given above was not all received by vessels direct at the mills, Cove Harbor, owing to the depth of water over the bar in entering Cove Harbor. When it was impossible to secure vessels of small draft, say 15 feet, we were forced to load vessels of greater draft, having them arrive and discharge at New York, which necessitated our bringing up these cargoes by lighters and tow to Cove Harbor from New York. This is very expensive and adds to the cost of the raw materials.
>
> Could we have sufficient water over the bar, the Stamford Manufacturing Co. would make the depth by dredging, at a portion of their docks, the same as over the bar, thus enabling vessels, say up to 20 feet draft, to enter and unload. Could this be done, the Cove Harbor would show up as one of the largest importing harbors in Connecticut.
>
> The Stamford Manufacturing Co. has already spent in dredging and building of docks, $50,000, and if the United States Government would give 20 feet over the bar, the Stamford Manufacturing Co. would gladly spend the money to complete the work, as stated, and have a dock with the same depth of water.
>
> This business has been established at the same place since 1796, and established as a corporation, under the name of The Stamford Manufacturing Co., since 1844.
>
> The years 1905, 1906, and 1907, show a normal business, the falling off in 1908, 1909, and 1910 being due to the general shrinkage of business throughout the United States since the panic of November, 1907. The year 1910 shows increase owing to the gradual improvement in business throughout the country.

In regard to the statement that the Stamford Manufacturing Co. has already spent $50,000 in dredging and building docks, it may be added that the estimated amount of dredging is about 188,000 cubic yards. While the figures as to the amount of dredging can not be verified they are believed to be substantially correct, as it is known that dredging has been done at several different times to a considerable extent, and that it has consisted in dredging out the channel through the outer bar for a length of about 2,000 feet, dredging an entrance channel across the bar, and making a basin at the head of the harbor. The existing depth in the basin is stated to be about 9 feet at mean low water, and judging from the draft of vessels which have actually entered the harbor, the depth over the outer bar is probably about 8 feet.

The docks of the company, which are built along both sides of the harbor for a considerable distance from the head are used for loading and unloading the various freight received at this harbor, but they are private docks and are not open to the public on equal terms, although the secretary of the company states that the public are frequently permitted to land at them by courtesy.

The improvement desired is a straighter and deeper entrance channel to the harbor over the bar at its mouth, so as to permit vessels drawing approximately 20 feet to enter the harbor at high tide. A channel of 12 to 13 feet depth would be sufficiently deep to allow most of the vessels which would wish to enter the harbor to enter it at high tide. If in dredging the channel, no rocks were encountered which would have to be removed, the improvement would not be an expensive one, but judging from the numerous outcroppings of rock in the immediate vicinity, it is quite probable that rock would be encountered; whether rock would be encountered or not can only be determined by a careful survey which, it is estimated, would cost $250.

There are no questions of terminal or transfer facilities, or the development or utilization of water power for industrial or commercial purposes involved.

In spite of the relatively large amount of commerce which would be affected by the desired improvement, I feel obliged to report that in my opinion it is not worthy of being undertaken by the General Government for the reason that one company only is concerned in the improvement. It is not of general benefit to navigation nor the community, except in so far as it would enable the Stamford Manufacturing Co. to obtain its raw materials at cheaper rates than it now obtains them. There is no prospect of any other manufacturing concern being benefited, nor any general development arising if the desired improvement is carried out.

Very respectfully, your obedient servant,

HARRY TAYLOR,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, November 9, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army.

Lieut. Col. Taylor states: "In spite of the relatively large amount of commerce which would be affected by the desired improvement, I feel obliged to report that in my opinion it is not worthy of being undertaken by the General Government for the reason that one company only is concerned in the improvement."

This reason for recommending that the work is not worthy of being undertaken by the General Government is not convincing to me. It appears that the commerce in question exists mainly through the activities of one manufacturing concern only, but it does not appear that a reduction of the cost of the raw materials used by that firm would not have a far-reaching effect on the community at large. I believe that a better rule for guidance in such a case is to determine the saving in cost which would be effected were the improvement made, and to compare the amount of such a saving, if any, with the interest on the cost of the improvement computed at a reasonable rate, added to annual maintenance charges. If such a comparison shows that a good return would be made for the investment of the people's money, I believe the improvement should be deemed worth making by the United States, irrespective of the number of firms or corporations directly affected, since under our system of taxation the revenue paid to the Government is computed from the total of imports, irrespective of the number of persons making such imports and further since one corporation may be composed of many individual stockholders and on its welfare may depend the livelihood of many people.

Lieut. Col. Taylor reports that the cost of a survey necessary to determine the cost of the improvement would be $250. This seems a reasonable price to pay for the information necessary to form a correct judgment of the value to the United States of this work.

I would recommend that an allotment of the sum required be made, and that Lieut. Col. Taylor be directed to make the necessary surveys and report results with such further information as will permit a judgment to be made as to the necessity for this improvement, regarded both as a separate work and in comparison with works in other localities reported as necessary.

W. M. Black,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors see p. 2.]

DATA RELATIVE TO COVE HARBOR, STAMFORD, CONN.

[Furnished by the Stamford Manufacturing Co.]

Foreign and domestic materials received at Cove Harbor and manufactured goods shipped from same from July 1, 1904, to June 30, 1910.

[Long tons.]

	1904-5	1905-6	1906-7	1907-8	1908-9	1909-10	Total.
Woods from foreign ports	29,190	34,716	29,231	17,362	2,651	16,154	129,304
Coal and miscellaneous	22,610	21,613	31,527	12,274	8,372	13,337	109,733
Total in raw material	51,800	56,329	60,758	29,636	11,023	29,491	239,037
Manufactured goods shipped	13,248	19,086	20,537	10,179	3,918	8,254	75,222
Total tonnage	65,048	75,415	81,295	39,815	14,941	37,745	314,259

Vessels from foreign ports to Cove Harbor from July 1, 1904, to June 30, 1910.

Class.	Number.	Flag.
Steamers	2	Norwegian, Danish.
Barks	15	British, Norwegian, Swedish.
Barkentines	10	British.
Schooners	22	American, British.
Brigs	4	British.
Brigantines	4	Do.

Vessels from foreign ports unloaded in New York owing to draft of water exceeding that over bar at Cove Harbor from July 1, 1904, to June 30, 1910.

Class.	Number.	Flag.
Steamers	24	American, British, Norwegian.
Barks	31	American, British, Norwegian, Italian, German.

Steam lighters and barges with tugs from New York to Cove Harbor July 1, 1904, to June 30, 1910.

Class.	Number.	Flag.
Steam lighters	566	American.
Barges	773	Do.
Tugs	620	Do.

NOTE.—No record of times when the company's steam lighter towed barges in place of regular towboats

Statement furnished by Mr. Fred Enos, collector of customs, Bridgeport, Conn., giving data in regard to size and rig of vessels entering the harbor and value of imports for Cove Harbor, Conn., from July 1, 1904, to June 30, 1910.

	Tons.
July 12, 1904, barkentine	499
Oct. 7, 1904, brig	162
Oct. 25, 1904, schooner	384
Nov. 18, 1904, schooner	250
Mar. 18, 1905, barkentine	499
Mar. 20, 1905, schooner	288
Mar. 29, 1905, schooner	199
Apr. 4, 1905, bark	471
Apr. 12, 1905, barkentine	540
Apr. 27, 1905, schooner	455
June 13, 1905, schooner	199
11 vessels.	
Sept. 25, 1905, bark	599
Oct. 4, 1905, bark	299
Oct. 6, 1905, bark	188
Oct. 12, 1905, barkentine	397
Oct. 27, 1905, barkentine	726
Dec. 9, 1905, barkentine	299
Jan. 19, 1906, barkentine	635
Jan. 19, 1906, barkentine	540
Jan. 24, 1906, barkentine	545
Mar. 8, 1906, bark	672
Apr. 5, 1906, barkentine	439
Apr. 24, 1906, barkentine	499
May 11, 1906, bark	471
May 14, 1906, bark	569
June 4, 1906, bark	397
June 5, 1906, bark	470
16 vessels.	

	Tons.
Aug. 1, 1906, schooner	199
Sept. 14, 1906, barkentine	635
Nov. 17, 1906, barkentine	458
May 24, 1907, barkentine	635
June 1, 1907, bark	599
5 vessels.	
Sept. 20, 1907, barkentine	632
Nov. 30, 1907, schooner	249
Dec. 27, 1907, steamer	507
Feb. 24, 1908, barkentine	635
4 vessels.	
June 5, 1909, schooner	270
June 28, 1909, barkentine	996
2 vessels.	
July 16, 1909, bark	856
July 19, 1909, schooner	400
July 19, 1909, bark	672
July 30, 1909, schooner	399
Oct. 20, 1909, barkentine	658
Dec. 6, 1909, schooner	188
Dec. 13, 1909, schooner	198
Dec. 22, 1909, schooner	292
Jan. 5, 1910, schooner	277
Feb. 26, 1910, bark	569
Feb. 26, 1910, brig	289
Mar. 21, 1910, schooner	219
Mar. 28, 1910, schooner	352
Apr. 11, 1910, schooner	280
Apr. 21, 1910, steamer	1,512
May 12, 1910, schooner	217
May 24, 1910, bark	672
June 13, 1910, bark	830
18 vessels.	

Value of imports.

Fiscal year—	
1905	$90,173
1906	179,362
1907	50,774
1908	34,848
1909	14,395
1910	166,717
Total	536,269

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1124.

NEW YORK HARBOR, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF NEW YORK HARBOR, N. Y., WITH A VIEW TO SECURING INCREASED WIDTH AND DEPTH OF WATER FROM A POINT AT OR NEAR SOUTHWEST SPIT, NORTHWEST OF SANDY HOOK, N. J., THROUGH LOWER NEW YORK BAY, RARITAN BAY, AND THE CHANNEL BETWEEN NEW JERSEY AND STATEN ISLAND, N. Y., TO THE CHANNEL IN UPPER NEW YORK BAY.

DECEMBER 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed with illustrations.

WAR DEPARTMENT,
Washington, December 10, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 23d ultimo, together with copies of reports from Col. W. T. Rossell, Corps of Engineers, dated September 16, 1911, and July 25, 1912, on preliminary examination and survey, respectively, of New York Harbor, N. Y., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 23, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of New York Harbor, N. Y.

1. There are submitted herewith, for transmission to Congress, reports dated September 16, 1911, and July 25, 1912, by Col. W. T. Rossell, Corps of Engineers, on preliminary examination and survey, respectively, of New York Harbor, N. Y., with a view to securing increased width and depth of water from a point at or near Southwest Spit, northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay, called for by the river and harbor act approved February 27, 1911.

2. These waterways have been previously improved by the General Government to a depth of 21 feet at mean low water, and it is reported that that depth now exists. The prime object of the improvement now desired is to afford access for deep draft cargo vessels to the channel between Staten Island and New Jersey (Arthur Kill), where there are many large industries and where others are in contemplation.

3. The district officer, who is also the division engineer, presents detailed estimates for channels 30 feet, 35 feet, and 40 feet deep, the channel to be 1,200 feet wide through Raritan Bay to Perth Amboy, thence 400 feet wide through Arthur Kill to east end of Shooters Island, and thence 500 feet wide to deep water in the upper bay. Two different routes for the part of the channel across Raritan Bay are considered, one by way of the present or Seguine Point route, and the other by a line leading straight from the main channel, lower New York Bay, to the turn near Great Beds Light. The estimates range in cost from a little over $19,000,000 to a little over $56,500,000, using round numbers. He states there is nothing in the statistics obtained to show that a low-water depth of over 30 feet is necessary and he recommends the improvement to that depth via the Seguine Point route.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated October 14, 1912. In connection with its consideration of these reports the board held a duly advertised public hearing in New York City, and made a personal examination of the waterway in question. After careful consideration and study, the board has arrived at the conclusion that the commerce of this locality has reached a point where some increased facilities are demanded, and for the reasons given in its report considers that these needs will be served for the present by a channel 25 feet deep extending from the upper end of the waterway down to Perth Amboy with a suitable turning basin. It therefore recommends a channel 25 feet deep from Perth Amboy to the channel in upper New York Bay and a turning basin of the same depth at the mouth of Fresh Kills at a total estimated cost of approximately $2,130,000 and $50,000 annually for maintenance.

5. After due consideration of the above-mentioned reports I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of this locality is deemed advisable so far as to secure an available channel depth of 25 feet and a channel width of 400 feet from Perth Amboy through Arthur Kill to the east end of Shooters Island, with a suitable turning basin of the same depth at the mouth of Fresh Kills, at an estimated cost of $2,130,000 for first construction and $50,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $500,000 with a continuing-contract authorization for the remainder with a view to completion of the work in a period of four years.

Edw. Burr,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, October 14, 1912.

To the Chief of Engineers, United States Army:

1. This is a report of survey of New York Harbor, N. Y., with a view to securing increased width and depth of water from a point at or near Southwest Spit, northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay, submitted in accordance with the act of February 27, 1911. The present project depth is 21 feet, and the mean tidal range is about 5 feet.

2. The district officer considered it desirable to secure data upon which estimates could be based for channels ranging in depth from 30 to 40 feet, and this was done. In considering depths of 35 to 40 feet it was found that, in addition to the 12 miles through Raritan Bay, channel work would have to be extended about 6 miles to the eastward of Southwest Spit. The district officer states there is nothing in the statistics obtained to show that a low-water depth of over 30 feet is at present necessary. The prime object of the improvement is to afford access for deep-draft cargo vessels to the channel between Staten Island and New Jersey, where there are now many large industries and where others are in contemplation.

3. To provide a depth of 30 feet from main channel off Sandy Hook, which now affords that depth, will require about 12 miles of dredging in Raritan Bay and 10 miles in Arthur Kill. If entrance is made by way of Ambrose Channel and Kill Van Kull, a 30-foot channel can be obtained through Arthur Kill to Perth Amboy by dredging only 10 miles, but a turning basin would have to be provided below the Rahway River in lieu of the channel across Raritan Bay.

4. The report of survey gives detailed estimates for channels 30, 35, and 40 feet in depth through the reach under consideration, crossing Raritan Bay both by way of Seguine Point, or the present channel route, and by way of a more expensive line leading straight from Main Channel to the turn near Great Beds Light. The channel is 1,200 feet in width across Raritan Bay to opposite Smith Street in Perth Amboy, thence through Arthur Kill 400 feet wide to east end of Shooters Island, and thence 500 feet wide to deep water in the upper bay. At the request of the board, the district officer also prepared estimates for a through channel 25 feet in depth by both the straight and the Seguine Point routes, including a turning basin at mouth of Fresh Kills. The estimates via the Seguine Point route, including a turning basin in the Arthur Kill for the 25 and 30 foot depths, are as follows:

Depth of channel.	Raritan Bay.	Arthur Kill and Kill Van Kull.	Total.
25 feet	$2,550,673.00	$2,126,888.38	$4,677,561.38
30 feet	7,738,557.98	11,371,948.01	19,110,505.99
35 feet	11,264,406.24	22,493,532.77	33,757,939.01
40 feet	14,168,983.13	42,465,576.08	56,634,559.21

The estimated cost of maintenance for the Raritan Bay section is $100,000 for the 25-foot channel and $150,000 for the 30-foot channel; for the Arthur Kill and Kill Van Kull section the estimate is $50,000 in each case.

5. The district officer, who is also division engineer, expresses the opinion that this waterway is worthy of additional improvement to the extent of providing the 30-foot channel via the Seguine Point route.

6. In connection with its consideration of this project the board held a public hearing in New York City on September 24, 1912, and made a personal examination of the waterway in question, with a view of determining the necessity of further improvement and more especially the need of the channel across Raritan Bay, and the comparative merits of channels 25 and 30 feet deep.

7. The need of increased channel dimensions is shown in the report on preliminary examination, to which reference is invited. It appears from data contained therein that there are now in excess of 500 vessels in use having a draft of 20 feet or more, carrying an approximate tonnage of 1,294,000, and that approximately 42 vessels were unable to dock on account of insufficient depth. Information regarding the number of vessels drawing over 20 feet that would be docked during a year, provided there was sufficient depth of water, is not specific, but it indicates that such number would be large.

8. While it is seen that there is a considerable tonnage carried on vessels of 20 feet draft or more, the amount that is handled in vessels of 25 feet or more is not large and constitutes a very small proportion of the total amount of traffic on this waterway, the great bulk of which is fairly well served by the present depth. If a depth of 30 feet were given, there would no doubt be some vessels making use of the waterway with a draft requiring that depth, but the number

would be limited, and in the opinion of the board would not justify at present the very large additional cost of a 30-foot channel over a 25-foot channel. There is evidence, however, that the present depth and width of the channel are inadequate to meet the growing demands of a considerable amount of traffic, and an increase in depth from 21 to 25 feet is a logical and economical step, and it is believed that this increase should first be given and its adequacy tested before incurring the much greater cost of a channel 30 feet in depth.

9. A large number of persons in attendance at the hearing addressed the board and in general terms advocated the channel across Raritan Bay, stating that it would be more convenient for vessels to depart by that route than to return through Kill Van Kull. It is stated in the report of the district officer that no distance will be saved by the channel through Raritan Bay except for vessels bound to the Amboys or to places between the Amboys and a point 5 miles above, as that point is about equidistant from the mouth of the harbor by way of Raritan Bay or the Ambrose Channel and the Kill Van Kull. Moreover, the entrance via the Ambrose Channel is better lighted at night and more easy of access. The principal commerce of this waterway, even if a greater depth is given, will be carried on vessels not exceeding 21 feet in draft, and these can be accommodated by the existing channel through Raritan Bay. In the opinion of the board, the benefits to be afforded by the greater depth across the bay are insufficient to warrant an expenditure of $2,500,000 for this channel and its large annual cost of maintenance. The additional time that may be required for some vessels in turning and going through Kill Van Kull is insignificant when compared with the length of an ordinary tramp steamer's journey.

10. After careful consideration and study, the board has arrived at the conclusion that the commerce of this locality has reached a point when some increased facilities are reasonably demanded, and that these needs will be fairly well served by a channel 25 feet in depth, extending from the upper end of the waterway down to Perth Amboy, with a suitable turning basin. It therefore recommends a channel 25 feet in depth from Perth Amboy to the channel in upper New York Bay and a turning basin at the mouth of Fresh Kills of the same depth, at a total estimated cost of approximately $2,130,000 and $50,000 annually for maintenance. The initial appropriation should be $500,000, with continuing contract authorization for the remainder, with a view to completion of the work in a period of four years.

11. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be coordinated with the project proposed in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the Board:

Lansing H. Beach,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF NEW YORK HARBOR, N. Y.

UNITED STATES ENGINEER OFFICE,
New York City, September 16, 1911.

SIR: 1. In compliance with department letter dated April 7, 1911, and pursuant to a provision of the river and harbor act approved February 27, 1911, I have the honor to make the following report upon a preliminary examination of New York Harbor, N. Y., with a view to securing increased width and depth of water from a point at or near Southwest Spit northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay.

I personally, with Asst. Engineer H. B. Gorham of this office, went over the route August 18, 1911.

Junior Engineer T. F. Appleby and Surveyor C. D. Mayhew were employed in collecting and tabulating commercial statistics.

2. The water route, as described in the above-mentioned act of Congress, from lower New York Bay by way of Staten Island Sound or Arthur Kill and Kill Van Kull to upper New York Bay practically forms three sides of a trapezium, the fourth side being formed by a line drawn from the vicinity of Sandy Hook through the Narrows to the mouth of Kill Van Kull. This route or figure has the following dimensions:

Beginning on the west side of the main channel opposite Southwest Spit and running westerly through Raritan Bay about 12 miles, thence northerly through "Arthur Kill, Staten Island Sound," or channel between Staten Island and New Jersey (one and the same waterway) about 12 miles, thence easterly through the lower end of Newark Bay and Kill Van Kull about 6 miles, thence southerly through the Narrows and lower New York Bay about 12 miles to point of beginning. This locality is all shown on United States Coast and Geodetic Survey Chart No. 369.

3. The distance requiring improvement to obtain, say 30 feet of water to correspond or connect with the main ship Bayside-Gedney Channel will be along the three sides of the trapezium above described, a distance of about 30 miles; this distance would depend upon the width of channel designed. To obtain a depth of 25 to 27 feet would reduce the length of improvement to about 20 miles; the natural channels in the eastern ends of Raritan Bay and Kill Van Kull already afford that depth, although a few shoals in Kill Van Kull would require removal.

A 30-foot or even a 40-foot channel in the Arthur Kill connecting with New York Harbor could be obtained by dredging in the Arthur Kill and limiting the approach to the Kill Van Kull and using the Ambrose Channel to the sea. The length to be improved for such a channel would be less than 20 miles.

4. Raritan Bay, Arthur Kill, and channel between Staten Island and New Jersey have been improved by the General Government under projects which provide for channels 300 feet in width and 21 feet in depth at mean low water. These projects are practically completed; the only work requiring to be done is in the Arthur Kill, for which funds are available, and consists in the removal of an area of rock and gravel on one side of the channel only, at the Baltimore & Ohio Railroad bridge, Elizabethport.

Details as to these projects are printed in the Annual Report of the Chief of Engineers for 1910,[1] copy herewith, pages 197 and 191–195, respectively.

5. This waterway now affords a navigable depth of about 21 feet at mean low water. The mean range of tides is about 5 feet. The general width of the Arthur Kill is from one-eighth to one-fourth of a mile, but it is contracted in places to about one-tenth mile (500 feet); the least width is 420 feet, at a point between Staten Island and Shooters Island. A branch channel being dredged 16 feet in depth north of Shooters Island will relieve the congestion at that point. The only bridge crossing the channel between Staten Island and New Jersey is that of the Baltimore & Ohio Railroad at Elizabethport, N. J., which has two draw openings each 200 feet in width, and clear height of 30 feet above high water.

6. If the waterway covered by this preliminary examination is deepened to 27 feet, it would form a link in the proposed intracoastal waterway in this locality, survey for which was authorized by the river and harbor act approved March 3, 1909, and the estimate of cost in that survey would be reduced to the extent that its route is duplicated or included in the improvement now under consideration.

7. References to previous reports upon examinations and surveys of Raritan Bay and the channel between Staten Island and New Jersey:

RARITAN BAY.

Annual reports Chief of Engineers.			House Executive documents.		
Year.	Part.	Page.	No.	Congress.	Session.
1881	1	717	45	Forty-sixth	Third.
1891	2	1013	109	Fifty-first	Second.
1895	1	1014	298	Fifty-third	Third.
1904	1	1158	184	Fifty-eighth	Second.
CHANNEL BETWEEN STATEN ISLAND AND NEW JERSEY.					
1873	1	943	[1] 52	Forty-second	Third.
1876	1	251	44	Forty-fourth	First.
1893	1	1083	77	Fifty-second	Second.
			273	Fifty-ninth	Do.
ARTHUR KILL.					
1887	1	337	17	Forty-ninth	Second.
1900	2	1525	[2] 393	Fifty-sixth	First.
1906	1	1043	591	Fifty-ninth	Do.
			337	do	Second.
1908[3]	1	184	533	Sixtieth	First.

[1] Senate Executive document. [2] Maps. [3] Does not contain the report, but is a reference to it.

8. Complete commercial statistics have been promised by the Staten Island Sound Deep Waterways Association by October 1, 1911; in the meantime the following report has been collected and compiled by this office.

These reports show that the commerce is rapidly increasing and that a deeper channel is required.

The variation of tonnage and valuation of commerce are also shown by the attached diagram.

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[1] Not printed.

COMMERCIAL STATISTICS—CALENDAR YEAR OF 1910.

Arthur Kill—Freight traffic.

Articles.	Amount in customary units.	Amount in short tons.	Valuation.
Asphalt and asphalt blocks	119,299 long tons	133,615	$1,183,996
Bricks	4,751,500 bricks	81,503	403,925
Cement and plaster	27,386 long tons	30,672	165,834
Chemicals	223,348,678 pounds	111,674	2,257,094
Clay and clay products	46,484 long tons	52,063	315,602
Coal	6,977,541 long tons	7,814,846	26,115,660
Iron and steel	40,892 long tons	45,739	2,801,800
Lumber	129,203,536 feet b. m	246,628	3,984,372
Machinery and manufactures	33,066 long tons	37,036	8,000,428
Oils	1,135,672 long tons	1,271,955	20,661,041
Ores and metals	781,966 long tons	875,802	79,800,220
Phosphates	292,548 long tons	327,668	5,562,283
Sand, stone, and gravel	12,344 long tons	13,825	16,990
General merchandise	102,617 short tons	102,617	9,154,646
Miscellaneous	204,547 long tons	229,092	4,428,785
Total		11,374,735	164,852,676
Commerce of the tributaries of the Arthur Kill, which passes over the Arthur Kill		6,426,242	98,499,344
Total		17,800,977	263,352,020

Arthur Kill—Vessel classification.

Class.	Number of trips.			Net registered tonnage.	Draft when loaded.
	American.	Foreign.	Total.		
Registered:					*Feet.*
Steamers	13,969	199	14,168	10–5,406	4–23½
Sailing	2,595	336	2,931	40–2,400	6–23
Barges	10,919		10,919	75–3,000	5–21
Unregistered:					
Steamers	12		12		
Sailing	36		36		
Barges	31,676		31,676		
Power boats	100,000		[1] 100,000		
Total	159,207	535	159,742		

[1] Estimated.

Report of deep-draft vessels plying on the Arthur Kill during the year 1910.

Name of party.	Number of vessels docked during the year drawing 20 feet of water.	Approximate tonnage carried.	Number of vessels unable to dock drawing over 20 feet because of insufficient depth of water.	Approximate number of vessels over 20 feet that would be docked during a year providing there was sufficient depth of water. Remarks.
Central R. R. Co. of New Jersey:				
Coal docks	20±	30,000	10	Number practically unlimited.
Freight docks	25±	45,000	15–20	Do.
Philadelphia & Reading R. R. Co.	300	750,000		Do.
The Warner Chemical Co	7	20,000		Expect to dock 15 vessels in 1911.
The United States Metals Refining Co.	13	18,000		Would increase fourfold.
American Smelting & Refining Co.	39	125,000		
The Grasselli Chemical Co	10–12	40,000	[1] 10–12	Would have vast increase.
Lehigh Valley R. R. Co., freight docks	32	52,000		
The Barber Asphalt Paving Co	53	114,000		Vast increase.
The American Agricultural Chemical Co., Bowker Fertilizer Co., Liebig Chemical Co., and Williams & Clark.	40	100,000		
The Warner Quintan Asphalt Co				Expect to dock 3 vessels in 1911.
Total	541	1,294,000	[2] 42	

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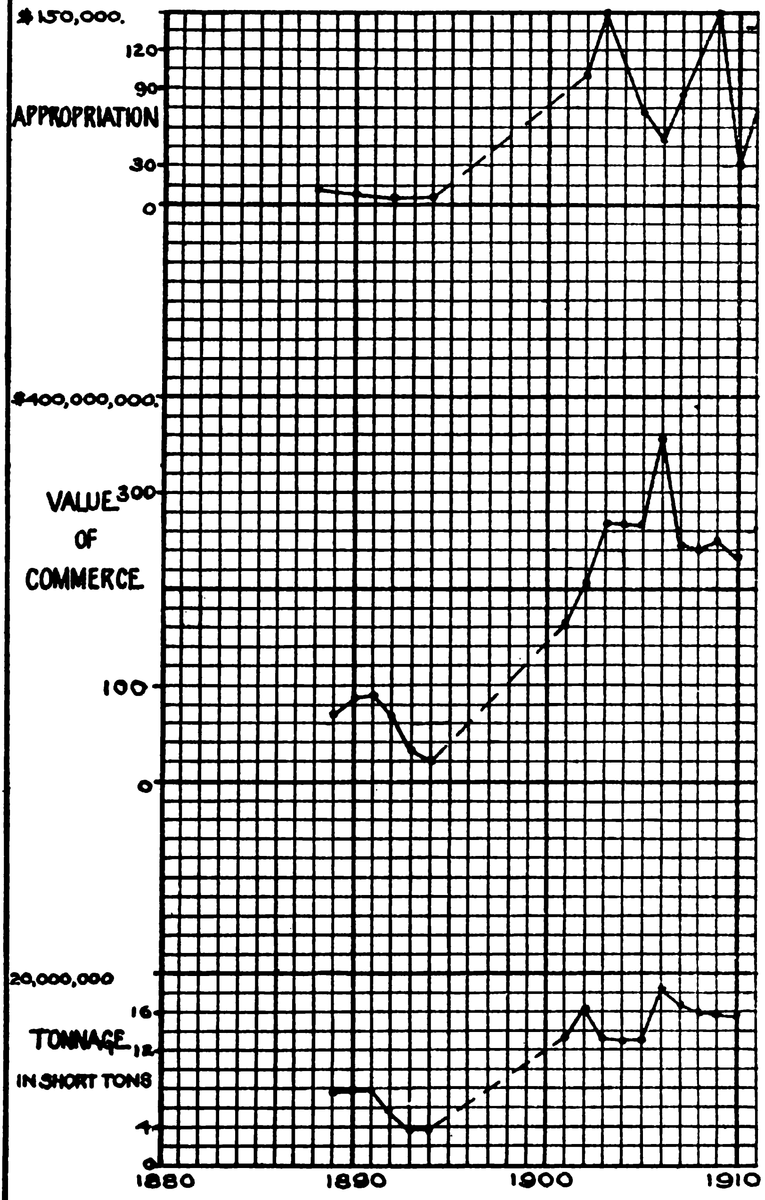
[1] These vessels are docked and unloaded from Carteret, N. J.

[2] Approximate.

ARTHUR KILL, N.Y.&N.J.

Diagram showing, annually, total freight carried, valuation of same, and appropriation, to June 30, 1911.



Vessels entering and clearing at the port during 1910.

[Data obtained from the collector of the port of Perth Amboy, N. J.]

Vessels.	Number.	Average tonnage.	Draft.
Steam	108	2,000	19 -23½
Sailing	294	300	10½-19
Total	402	....	....

	Tonnage.	Value.
Imports	165,000	$19,322,000
Exports	70,000	2,537,000
Total	235,000	21,859,000

Commercial statistics.

ARTHUR KILL, N. Y. AND N. J.

Year.	Short tons.	Valuation.	Year.	Short tons.	Valuation.
1889	7,555,336	$68,353,490	1903	12,893.910	$267,046,086
1890	7,779,076	85,105,783	1904	12,893,910	267,046,086
1891	7,781,351	87,018,939	1905	13,128,484	265,193,813
1892	5,415,204	69,934,766	1906	18,563,780	355,579,817
1893	3,790,425	31,630,135	1907	16.741,846	245,032,666
1894	3,721,639	20,515,139	1908	15,995,231	239,395,113
1901	13,049,456	165,199,487	1909	15,629,768	249.114.846
1902	16,259,128	205,707,009	1910	17,800,977	263,352,020

CHANNEL BETWEEN STATEN ISLAND AND NEW JERSEY (INCLUDING ARTHUR KILL).

Year.	Short tons.	Valuation.	Year.	Short tons.	Valuation.
1881	3,794,000	....	1895	11,048.872	$77.030,302
1883	....	$61,592,750	1896	10,363,475	67,274,131
1884	....	60,000,000	1897	11,760.932	88,386,977
1885	9,800,000	....	1898	11,406,372	143.640,800
1886	9,455,531	67,539,512	1899	12,669,430	165,716.016
1887	9,455,531	67,539,512	1900	12,373,349	156,601,291
1889	9,880,720	94,091,422	1901	13.049,456	165,199,487
1890	10.270,976	144,684,140	1902	18,218,553	280,516,505
1891	10,325,819	147,389,419	1903	15,825,239	327,477,738
1892	4,081,184	78,815,355	1905	16,059,814	325,625,465
1893	3,901,980	54,553,279	1906	19,149,535	396.266,084
1894	5,834,667	40.497,763			

RARITAN BAY, N. J.

Year.	Short tons.	Valuation.	Year.	Short tons.	Valuation.
1883	4,808,854	$25,831,000	1901	5,288,693	$49,310,429
1885	7,982,636	....	1902	6,107,497	56,712,469
1889	6,846,579	....	1903	5,022,250	101,842,455
1895	4,355,674	35,313,471	1905	5,932,624	125,915,972
1896	5,185,055	31,937,800	1906	7,204,114	114,358,610
1897	5,424,324	....	1907	8,315,344	139,228,344
1898	6,218,771	47,576,353	1908	8,729.748	136.550,115
1899	7,288,290	51,246,297	1909	8,283.839	107,829,063
1900	7,322,534	53,200,720	1910	9,168,913	132,234,295

9. The terminal facilities are good at present, and are capable of great expansion, especially on the mainland on the west side of the Arthur Kill, which has direct railroad connections with the south and west by means of the great railroad lines, as shown by the following information in this matter:

(*a*) There are the following public docks with facilities extended to all on equal terms: City dock, Bayonne, N. J.; city dock, Elizabethport, N. J., New York City docks at Mariners Harbor, and Rossville, Staten Island.

(*b*) The steamboat lines plying in these waters will stop at these docks on notice. There is no direct rail connection at Rossville. At Mariners Harbor the Staten Island Rapid Transit Railroad runs to within a short distance from the dock and a direct connection could be made with the Baltimore & Ohio Railroad system. At Elizabethport the city dock is in close proximity to the Central Railroad Co. of New Jersey freight docks. There is no direct rail connection at the Bayonne dock.

(*c*) Terminal facilities controlled by individuals or corporations with privileges extended to all on equal terms are at the foot of Bayway Avenue, Elizabethport, N. J.; Chelsea, Staten Island; Radley's Dock at Carteret, N. J.; Sewaren Hotel Dock, Sewaren, N. J.; and Merritt's Dock at Perth Amboy, N. J.

The New York & New Jersey Steamboat Co. has docks at Elizabethport, N. J.; Tottenville, Staten Island; and Perth Amboy, N. J., over which the public may send and receive freight.

(*d*) Available space is to be had at intervals along the Sound, where wharves of a public nature can be constructed, making it possible for each community to have access to the same. There are now several wharves owned by private parties so located as to be accessible to the public, and which can be leased or purchased for public use.

(*e*) The docks open to the public use have no mechanical appliances for handling freight. Practically all the private wharves have appliances for handling the particular commodities involved in their business, ranging in type from the simple derrick to modern patented devices.

(*f*) Terminal and transfer facilities not open to the public on the Arthur Kill, i. e.:

The Baltimore & Ohio Railroad Co., at St. George, Staten Island.
The Central Railroad Co. of New Jersey, at Elizabethport, N. J.
The Philadelphia & Reading Railroad Co., at Port Reading, N. J.
The Lehigh Valley Railroad Co., at Perth Amboy, N. J.

All the above have large coal and freight terminals.

Practically all the tonnage from the large Pennsylvania Railroad terminal at South Amboy, N. J., near the southern extremity of the Arthur Kill, passes over this waterway.

The following industries are located on the Arthur Kill and have both railroad and water connections:

J. B. King Cement Co., New Brighton, Staten Island.
McAllister Dry Dock Co., New Brighton, Staten Island.
General Chemical Co., Bayonne, N. J.
Pure Oil Co., Bayonne, N. J.
Tide Water Oil Co., Bayonne, N. J.
Atlantic, Gulf & Pacific Oil Refining Co., Bayonne, N. J.
Texas Oil Co., Bayonne, N. J.
Staten Island Ship Building Co., Port Richmond, Staten Island.

Standard Varnish Co., Port Richmond, Staten Island.
Hecker-Jones-Jewell Milling Co., Mariners Harbor, Staten Island.
Milliken Bros., Mariners Harbor, Staten Island.
Proctor Gamble Soap Co., Mariners Harbor, Staten Island.
Singer Manufacturing Co., Elizabethport, N. J.
S. L. Moore & Sons (foundry), Elizabethport, N. J.
F. L. Heidritter (lumber), Elizabethport, N. J.
New York Lubricating Oil Co., Elizabethport, N. J.
Pennsylvania and Delaware Oil Co., Elizabethport, N. J.
Alden S. Swan Oil Co., Elizabethport, N. J.
New York Oil & Varnish Co., Elizabethport, N. J.
Bowker Fertilizer Co., Elizabethport, N. J.
Waclark Wire Co., Elizabethport, N. J.
Standard Oil Co., Elizabethport, N. J.
Swan & Finch Oil Co., Elizabethport, N. J.
Grasselli Chemical Co., Grasselli, N. J.
Warner Rolling Mills, Warner, N. J.
Warner Quintan Asphalt Paving Co., Warner, N. J.
Frank F. Munroe Co. (ink), Carteret, N. J.
Williams & Clark Fertilizer Co., Carteret, N. J.
Warner Chemical Co., Carteret, N. J.
Wheeler Condensing Engine Co., Carteret, N. J.
Benj. Moore Muresco Works, Carteret, N. J.
Liebig Chemical Co., Carteret, N. J.
Goldschmidt Detinning Co., Chrome, N. J.
Chrome Steel Works, Chrome, N. J.
United States Metals & Refining Co., Chrome, N. J.
Armour Co., Chrome, N. J.
Port Reading Creosote Plant, Port Reading, N. J.
Maurer Brick & Tile Co., Perth Amboy, N. J.
Barber Asphalt Co., Perth Amboy, N. J.
American Smelting & Refining Co., Perth Amboy, N. J.
United Lead Co., Perth Amboy, N. J.
Hazard, Hillman & Harris Lumber Co., Perth Amboy, N. J.
Public Service Corporation of New Jersey, Perth Amboy, N. J.
Atlantic Terra Cotta Co., Perth Amboy, N. J.
Standard Underground Wire & Cable Co., Perth Amboy, N. J.
Roessler & Hasslacher Chemical Co., Perth Amboy, N. J.

The following industries located on the Arthur Kill have no direct rail connections:

New Jersey Dock & Bridge Building Co., Mariners Harbor, Staten Island.
Shooters Island Shipbuilding Co., Mariners Harbor, Staten Island.
Du Bois Bros. Dredging Co., Mariners Harbor, Staten Island.
John A. Snyder & Bro. Lumber Co., Mariners Harbor, Staten Island.
Brewer Dry Dock, Mariners Harbor, Staten Island.
Burlee Dry Dock Co., Mariners Harbor, Staten Island.
Staten Island Shipbuilding Co., Mariners Harbor, Staten Island.
Rankin Dry Dock, Mariners Harbor, Staten Island.
New Jersey Dry Dock, Elizabethport, N. J.
Antimony Works, Chelsea, Staten Island.
American Linoleum Works, Linoleumville, Staten Island.
Richmond Brick Co., Green Ridge, Staten Island.
Oakland Chemical Co., Rossville, Staten Island.
International Ultramarine Works, Rossville, Staten Island.
Kreiser Brick Manufacturing Co., Kreiserville, Staten Island.
Southern Shipbuilding Co., Tottenville, Staten Island.
Henry Cossey Shipbuilding Co., Tottenville, Staten Island.
Ellis Shipbuilding Co., Tottenville, Staten Island.
Seguine-Runyon-Stile Co. (building material), Tottenville, Staten Island.
A. C. Brown & Sons Shipyard, Tottenville, Staten Island.
Raritan Dry Dock, Perth Amboy, N. J.
Perth Amboy Dry Dock, Perth Amboy, N. J.
Grecian Dock (Safe Co.), Perth Amboy, N. J.
The Donovan Dock, Perth Amboy, N. J.

10. The proposed improvement for navigation would have no effect on water-power development, floods, or land reclamation within the scope of the investigation contemplated in section 3 of the river and harbor act approved June 25, 1910.

A greater depth of water would increase land values and encourage the filling in of the marshes bordering the waterway, and the material excavated in making the improvement might be used in filling these lands. This use of the material, however, would probably not result in any saving to the United States, as the material in the Arthur Kill and near the land in Raritan Bay requires to be dredged and can not be pumped successfully or economically.

11. In my opinion this locality is worthy of further improvement by the General Government, but a survey is required to determine the measure of the improvement which may appear to be necessary at this time.

12. It is estimated that the required surveys, plans, and estimates would cost about $4,500, and it is recommended that that amount be allotted to defray the expenses of the survey from the appropriation for examinations, surveys, and contingencies of rivers and harbors contained in section 2 of the river and harbor act approved February 27, 1911.

Very respectfully, your obedient servant,

Wm. T. Rossell,
Colonel, Corps of Engineers.

The Chief of Engineers, U. S. Army.

[Second indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, September 26, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

This examination is called for with a view to securing increased width and depth of water from a point at or near Southwest Spit, northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay. These waterways have been improved by the General Government under projects which provide generally for a channel depth of 21 feet at mean low water and a width of 300 feet. The work contemplated has been practically completed, and it is reported that a navigable channel of about the projected depth now exists.

The improvement desired is an increase in both width and depth. An examination of the commercial statistics submitted shows that the commerce of these waters has been increasing rapidly and has reached enormous proportions, amounting to a total of probably 20,000,000 tons, with a valuation of about $400,000,000. The district officer, who is also division engineer, is of opinion that the locality is worthy of further improvement by the General Government, and he recommends that a survey and estimate be authorized to determine the measure of justifiable improvement.

In view of the very great tonnage involved, the increasing commercial development along these waterways, and the increasing size of commercial vessels, the board believes that additional channel capacity would be of material benefit to commerce and navigation, and that some further improvement is advisable if its cost bears a just proportion to the probable resulting benefit. In order that this comparison may be made, the board concurs in recommending that a survey and estimate be authorized.

For the Board:

S. W. Roessler,
Colonel, Corps of Engineers,
Senior Member Present.

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 9, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of a portion of New York Harbor, N. Y., authorized by the river and harbor act of February 27, 1911.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fourth indorsement.]

WAR DEPARTMENT, *October 10, 1911.*

Approved:

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF NEW YORK HARBOR, N. Y.

UNITED STATES ENGINEER OFFICE,
New York City, July 25, 1912.

SIR: 1. In compliance with instructions contained in letter of the Chief of Engineers dated October 12, 1911, I have the honor to submit the following report, with accompanying tracings [1] in three sheets, upon a survey of New York Harbor, N. Y., with a view to securing increased width and depth of water from a point at or near Southwest Spit, northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay, for which provision is made in section 2 of the river and harbor act approved February 27, 1911.

2. Field work was commenced without delay upon receipt of the order, and was continued diligently until stopped by ice in January. Work was resumed in March, 1912, as soon as practicable after the ice had mostly disappeared, and was continued until completion of the survey, the last of May, 1912. This work was placed under the direction of Mr. H. B. Gorham, assistant engineer, and the field work was executed by parties in charge of Mr. George McC. Taylor, junior engineer, and Mr. C. D. Mayhew, surveyor.

3. It appears from information received from the Staten Island Sound Deep Waterways Association that it would be desirable to make the survey and estimate with a view of obtaining channels of 30 to 40 feet in depth. Channels of 35 or 40 feet depth would require the deepening and improvement of the main channel and Gedney Channel, New York Harbor, out to the entrance or mouth of the harbor, a distance of 6 miles, in addition to the crossing of Raritan Bay, about 12 miles. Thirty feet depth by way of the main channel,

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[1] Not printed.

which now affords that depth, will require about 12 miles of dredging in Raritan Bay, and 10 miles in the Arthur Kill.

4. There is nothing in the statistics obtained to show that a low-water depth of over 30 feet is at present necessary. A depth of 30 feet would probably be sufficient for all vessels that would use this waterway at this time. The object of the proposed channel is to render available for deep-draft vessels the channel between Staten Island and New Jersey. On both sides of the Kills are many manufacturing establishments, and these are increasing in numbers. A 30-foot channel in the Arthur Kill or channel between Staten Island and New Jersey, between Shooters Island and Perth Amboy, by way of Ambrose Channel, can be obtained by dredging 10 miles in the Arthur Kill. It will be noticed that if vessels come into the lower bay by the Ambrose Channel, and from thence go through the Narrows, they can carry 40 feet to the eastern entrance of the Kill Van Kull, and by removing Baxters Ledge and other small obstructions, can carry that depth nearly through the Kill Van Kull. No distance will be saved by crossing Raritan Bay to the Arthur Kill, except for ships bound to the Amboys, or to points about 5 miles above the Amboys, but 30-foot navigation by way of Ambrose Channel, the Narrows, and Kill Van Kull, would require a turning basin below the Rahway River, or it would be necessary for the vessels to back out 7 miles to Newark Bay, where there is width to turn a ship of that draft with corresponding length. To avoid this maneuver of backing out, or going below to turn around, would require, as already stated, about 12 miles of dredging in Raritan Bay. The Ambrose Channel route has a further advantage of being well lighted at night, and is easy of access.

5. The State of New Jersey by the establishment of riparian lines encroaching upon the Arthur Kill, has limited the use of that waterway to comparatively small vessels throughout a large part of its length; to be more precise, the establishment of these lines, which have been approved by the United States, have limited the possible width of the channel of the Arthur Kill to 400 feet in some places. A ship drawing from 23 to 30 feet is usually 350 to 550 feet in length.

6. Soundings show a very considerable shoaling in the mouth of Raritan Bay as compared with surveys made several years ago. This shoaling is believed to be due to the material stirred up and running overboard in the hydraulic process of dredging of Ambrose Channel and the main ship channel.

7. A large number of borings were made to show the class of material necessary to dredge in making the proposed channel. In Raritan Bay the material is mud, sand, clay, and gravel, and is such as can be easily dredged to any required depth. Rock and hardpan bottom is found in the Arthur Kill from Carteret to Shooters Island, a distance of about 6 miles.

8. The amounts of material requiring removal for 30, 35, and 40 foot channels are given in the estimates. The Kill Van Kull requires but little improvement to provide any depth up to 40 feet. Baxters Ledge, at the eastern end, would require removal for any increased depth, as it is in the center of the entrance and there are rocks and shoals on either side of it.

9. Two lines were selected for channels in Raritan Bay; one runs from Southwest Spit and follows the present line of improvement to

Seguine Point, thence along the shore of Staten Island to the mouth of Arthur Kill; the other line is a direct one across the bay from Southwest Spit to the mouth of Arthur Kill.

10. The following statistics for this waterway have been presented by James N. Stout, secretary of the Staten Island Sound Deep Waterways Association:

COMMERCIAL STATISTICS—CALENDAR YEAR 1911.

Vessel classification.

Class.	Number of trips.		Total.	Net registered tonnage.	Draft when loaded.
	American.	Foreign.			
Registered:					*Feet.*
Steamers	24,750	110	24,860	70-2,600	6-28
Sailing	1,703	175	1,878	20-2,200	5-23
Barges	27,885	....	27,885	100-3,000	5-20
Unregistered:					
Sailing	19	....	19	....	....
Barges	11,541	....	11,541	....	....
Total	65,898	285	66,183	20-3,000	4-28

Freight traffic.

Articles.	Amount (short tons).	Valuation.
Coal and general merchandise	16,467,767	$62,106,896
Chemicals	158,137	4,651,114
Crude and refined asphalt	179,611	1,716,876
Fertilizers	313,256	6,150,990
Fire and common brick	36,659	223,664
General merchandise	322,829	16,141,450
Iron and steel	58,858	3,096,755
Machinery	90,033	9,843,519
Miscellaneous	93,082	1,575,425
Oils and oil products	5,680,160	110,480,530
Ores and metals	571,450	106,534,679
Plaster and products	536,196	5,361,960
Stone, sand, and clay	200,000	100,000
Terra cotta	21,199	234,114
Total	24,729,237	328,217,972
Estimated commerce of Passaic River passing through this waterway	2,795,857	127,219,684
Estimated commerce of other tributaries passing through this waterway	3,000,000	60,000,000
Grand total	30,525,094	515,437,656

ESTIMATES.

Estimates for channels from main channel off Sandy Hook, through lower New York Bay, Raritan Bay, Arthur Kill, and Kill Van Kull to upper New York Bay.

These estimates are subdivided so that cost can be ascertained in each case with or without the Raritan Bay and New York Harbor channels. Annual maintenance Raritan Bay route, $200,000. Annual maintenance Ambrose Channel route, not including Ambrose Channel already provided for, $50,000.

Estimates are based on scow measurement and include side slopes and overdepths of 2 feet for dredging and 1 foot in hardpan and rock excavation. Depths refer to mean low water.

Channel 30 feet deep.

Dredging	
Straight channel in bay from main channel to turn near Great Beds Light, 38,786,950 cubic yards, at 16 cents (channel 1,200 feet wide)	$6,205,912.00
From turn near Great Beds Light around Wards Point to opposite Smith Street, Perth Amboy, 5,246,577 cubic yards, at 17 cents.	891,918.09
From Smith Street, Perth Amboy, to east end of Shooters Island, 9,033,781 cubic yards, at 19 cents (channel 400 feet wide)	1,716,418.39
Excavation of rock and hardpan over same area, 3,216,709 cubic yards, at $2.50	8,041,772.50
From east end of Shooters Island to deep water in upper bay, 8,731 cubic yards, at 19 cents (channel 500 feet wide)	1,658.89
Excavation of rock and hardpan over same area, 148,264 cubic yards, at $2.50	370,660.00
	17,228,339.87
10 per cent for engineering and contingencies	1,722,833.98
Total	18,951,173.85
Seguine Point Channel route estimate	18,882,118.73
Difference in favor of Seguine Point route	69,055.12

Channel 35 feet deep.

Dredging:	
Straight channel in bay from main channel to turn near Great Beds Light, 56,079,381 cubic yards, at 16 cents (channel 1,200 feet wide)	$8,972,700.96
From turn near Great Beds Light around Wards Point to opposite Smith Street, Perth Amboy, 7,593,244 cubic yards, at 17 cents (channel 1,200 feet wide)	1,290,851.48
From Smith Street, Perth Amboy to east end of Shooters Island, 10,221,263 cubic yards, at 19 cents (channel 400 feet wide)	1,942,039.97
Excavation of rock and hardpan over same area, 6,627,000 cubic yards, at $2.50	16,567,500.00
From east end of Shooters Island to deep water in upper bay, 121,822 cubic yards, at 19 cents (channel 500 feet wide)	23,146.18
Excavation of rock and hardpan over same area, 766,392 cubic yards, at $2.50	1,915,980.00
	30,712,218.59
10 per cent for engineering and contingencies	3,071,221.86
Total	33,783,440.45
Seguine Point channel route estimate	33,757,939.01
Difference in favor of Seguine Point route	25,501.44

Channel 40 feet deep.

Dredging:	
Straight channel in bay from main channel to turn near Great Beds Light, 69,963,696 cubic yards, at 16 cents (channel 1,200 feet wide)	$11,194,191.36
From turn near Great Beds Light around Wards Point to opposite Smith Street, Perth Amboy, 9,939,911 cubic yards, at 17 cents (channel 1,200 feet wide)	1,689,784.87
From Smith Street, Perth Amboy, to east end of Shooters Island, 13,561,216 cubic yards, at 19 cents (channel 400 feet wide)	2,576,631.04
Excavation of rock and hardpan over same area, 11,295,640 cubic yards, at $2.50	28,239,100.00
From east end of Shooters Island to deep water in upper bay, 187,898 cubic yards, at 19 cents (channel 500 feet wide)	35,700.62
Excavation of rock and hardpan over same area, 3,101,455 cubic yards, at $2.50	7,753,637.50
	51,489,045.39
10 per cent for engineering and contingencies	5,148,904.54
Total	56,637,949.93
Seguine Point channel route estimate	56,634,559.21
Difference in favor of Seguine Point route	3,390.72

Comparisons, 30-foot, 35-foot, and 40-foot channels.

Dredging, straight channel:	
Lower New York Bay and Raritan Bay, between main channel and turn near Great Beds Light—	
30-foot channel 1,200 feet wide, 38,786,950 cubic yards, at 16 cents	$6,205,912.00
35-foot channel 1,200 feet wide, 56,079,381 cubic yards, at 16 cents	8,972,700.96
40-foot channel 1,200 feet wide, 69,963,696 cubic yards, at 16 cents	11,194,191.36
Raritan Bay and Lower Bay (via Seguine Point and Princes Bay—	
30-foot channel 1,200 feet wide, 38,355,355 cubic yards, at 16 cents	6,136,856.80
35-foot channel 1,200 feet wide, 55,919,997 cubic yards, at 16 cents	8,947,199.52
40-foot channel 1,200 feet wide, 69,942,504 cubic yards, at 16 cents	11,190,800.64
Raritan Bay, from turn near Great Beds to opposite Smith Street, Perth Amboy—	
30-foot channel 1,200 feet wide, 5,246,577 cubic yards, at 17 cents	891,918.09
35-foot channel 1,200 feet wide, 7,593,244 cubic yards, at 17 cents	1,290,851.48
40-foot channel 1,200 feet wide, 9,939,911 cubic yards, at 17 cents	1,689,784.87
From opposite Smith Street, Perth Amboy, to east end of Shooters Island—	
30-foot channel 400 feet wide, 9,033,781 cubic yards, at 19 cents	1,716,418.39
35-foot channel 400 feet wide, 10,221,263 cubic yards, at 19 cents	1,942,039.97
40-foot channel 400 feet wide, 13,561,216 cubic yards, at 19 cents	2,576,631.04
Arthur Kill, rock and hardpan excavation—	
30- foot channel 400 feet wide, 3,216,709 cubic yards, at $2.50	8,041,772.50
35-foot channel 400 feet wide, 6,627,000 cubic yards, at $2.50	16,567,500.00
40-foot channel 400 feet wide, 11,295,640 cubic yards, at $2.50	28,239,100.00
Kill Van Kull, dredging—	
30-foot channel 500 feet wide, 8,731 cubic yards, at 19 cents	1,658.89
35-foot channel 500 feet wide, 121,822 cubic yards, at 19 cents	23,146.18
40-foot channel 500 feet wide, 187,898 cubic yards, at 19 cents	35,700.62
Kill Van Kull, rock and hardpan excavation—	
30-foot channel 500 feet wide, 148,264 cubic yards, at $2.50	370,660.00
35-foot channel 500 feet wide, 766,392 cubic yards, at $2.50	1,915,980.00
40-foot channel 500 feet wide, 3,101,455 cubic yards, at $2.50	7,753,637.50

11. In my opinion this waterway is worthy of improvement by the General Government to the extent of making a channel 30 feet deep at mean low water from "Southwest Spit, northwest of Sandy Hook, N. J., through lower New York Bay, Raritan Bay, and the channel between New Jersey and Staten Island, N. Y., to the channel in upper New York Bay," via the Seguine Point Channel, in accordance with the foregoing estimates. Besides a small reduction in the cost of the Seguine Point route it has a further advantage of continuing the navigation along the old lines of improvement, and by following the shore of Staten Island for a distance of about 3 miles it brings that section of the island within easy reach of the proposed channel for terminal purposes.

12. In my opinion this work should be prosecuted at a rate sufficient to secure its completion within a period of about 12 years. The initial appropriation should be $1,500,000 and succeeding annual appropriations $1,500,000.

13. A letter received from the Philadelphia & Reading Railway Co., dated November 24, 1911, in relation to this proposed improvement is forwarded herewith.

Very respectfully, your obedient servant,

WM. T. ROSSELL,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, U. S. Army.

[For Report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

LETTER OF THE PHILADELPHIA & READING RAILWAY CO.

PHILADELPHIA & READING RAILWAY CO.,
Port Reading, N. J., November 24, 1911.

DEAR SIR: Having further reference to our exchange of correspondence of May 24 and May 26, in relation to the channel conditions in the vicinity of Princess Bay and Sewaren, N. J. In this connection I beg to quote herewith a communication we received to-day from Lembcke & Co., 78 and 80 Wall Street, New York.

"We beg to thank you for your letter of the 1st instant, advising us that the depth of the water in the channel leading into Port Reading was correctly given us by the Perth Amboy pilot office.

"All of our steamers when fully loaded draw considerably more than, say, 22 feet, which would be the most a steamer could safely draw when entering the channel, and at some future time, unless the channel leading to your dock has been sufficiently dredged to allow steamers of greater draft to enter, we might at one time or another have considerable trouble and expense.

"With this next delivery we are glad to be able to advise you that we have been able to make arrangements with the owners of the steamer by which they have agreed to take a somewhat smaller cargo than the steamer can carry in order to allow her to safely enter the channel. This proceeding, however, will cost the owners considerable money, as they have to take a cargo of about 300 to 400 tons short of their capacity and losing freight on 300 or 400 tons is a considerable item, and we hardly believe that the owners or any other owners would be willing to do this again. As according to our contract the Philadelphia & Reading R. R. should give us facilities up to 26 feet we are writing to ask if you would please use your influence with the Government authorities to get the channel dredged to sufficient depth. We are writing this only to avoid trouble in the future."

These shoal places which we have frequently referred to will seriously interfere with navigation of deep-draft vessels that this company will be compelled to charter in order to take care of cargoes of creosote, oils, or other materials for our new creosoting works at Port Reading, and it will mean considerable expense to this company if vessels can only come in with part cargoes. I trust you will see the position we are placed in and will do whatever you can to relieve the channel conditions at an early date.

Thanking you for your cooperation and many courtesies, I beg to remain,

Very truly,

L. J. BARRETT,
Shipping and Freight Agent.

Col. WM. T. ROSSELL,
Corps of Engineers.

LETTER OF THE STATEN ISLAND SOUND DEEP WATERWAYS ASSOCIATION.

STATEN ISLAND SOUND DEEP WATERWAYS ASSOCIATION,
New York, October 3, 1911.

DEAR SIR: The reports we have to date of the freight carried through the channel between Staten Island and New Jersey during the year ended December 31, 1910, show a total of 25,796,723 tons, valued at $389,816,184.

Inclosed herewith, we beg to hand you the original correspondence and reports from which these figures were obtained, together with a list of shippers showing the tonnage and valuations reported by each concern. As some of these reports have been made with the understanding that the information contained therein is not to be made public, but only used in arriving at the totals, we should like to have both the list and the correspondence returned to us after you have examined them and verified the totals.

Many concerns along this waterway have not yet been able to prepare statements of their shipments. It is estimated that when these figures are available, the tonnage above stated will be increased by approximately 2,000,000 tons.

Yours, truly,

James N. Stout,
Secretary, Staten Island Sound Deep Waterways Association.

Note.—The original correspondence and reports referred to in this letter have been carefully examined and the total given found to be correct.

H. B. Gorham,
Assistant Engineer.

LETTER OF UNITED STATES METALS REFINING CO.

United States Metals Refining Co.,
New York, June 30, 1911.

Dear Sir: Referring to your letter of the 16th instant and previous letter, regarding tonnage moved to our chrome plant, we docked at our chrome plant in 1910 fourteen steamers, carrying 37,000 tons of ore, and for the five months of 1911 eight steamers, carrying 25,300 tons. Several of the steamers carried only 1,500 tons, but the majority of the steamers carried cargoes ranging from 3,300 to 4,000 tons. We were obliged to charter only such steamers as could pass in through the port of Perth Amboy and up the Staten Island Sound.

We received by lighters from New York during 1910 28,600 tons and for the five months of 1911, 9,700 tons, all of which material could have been brought to our dock by steamers if the width and depth of the channel had been sufficient to take vessels of 26 and 27 feet draft.

We have a considerable tonnage of material moving from Huelva, Spain, to our chrome plant and are obliged to charter vessels with a draft of not over 22 feet. We are offered from time to time vessels of 25 and 26 feet draft and 6,000 tonnage at a freight rate considerably less than we are obliged to pay for smaller boats. The tonnage mentioned as having arrived in New York and lightered to our plant arrived in boats ranging from 360 to 450 feet in length and with a draft of from 23 to 27 feet. There would have been considerable saving to us, both in the cost of lightering and in the stevedoring of the cargo, if the above-mentioned tonnages could have been brought direct to Chrome.

In recent correspondence with some steamship agents, they advised that our dock should be dredged to at least 26 feet and "also that the channel should allow the same draft, as with the tendency of building bigger steamers every year, it is more than probable that boats of this description will be used for handling similar cargoes to yours."

The average value of the ore received by steamers at our dock in the periods given above is in the neighborhood of $15 per ton, while the average value of the ore received by lighter from New York is in the neighborhood of $50 per ton. If there is any further information which I can furnish you along these lines, I shall be pleased to have you advise me.

Yours, very truly,

F. Y. Robbertson,
General Manager.

Mr. James N. Stout,
Secretary Staten Island Sound Deep Waterways Association,
New York, N. Y.

LETTER OF THE BARBER ASPHALT PAVING CO.

The Barber Asphalt Paving Co.,
Philadelphia, July 7, 1911.

Dear Sir: We regret that we have been unable to give you earlier answer to your letter of June 15 requesting certain statistics with reference to vessel movements at our plant at Maurer, but the delay has really been unavoidable.

For the matter of convenience, and the better to serve your purpose we have selected the business of the year of 1910 as an illustration of the volume of shipping representative of the business up to the present time. During the calendar year of 1910 there were received at our plant at Maurer 37 cargoes of lake asphalts from Trinidad and Venezuela, and 3 cargoes of lumber from southern United States ports; the total tonnage of these 40 cargoes being 97,492 tons. We shipped from our docks during the same period 13 separate cargoes of manufactured asphalt blocks destined to southern United States ports and the tonnage of which was 17,944 tons.

The aggregate of the above was 53 cargoes, a total tonnage of 115,436 representing in value $2,061,990.

In the above we have not taken account of the innumerable barges and other small craft dispatched from Maurer for New York City proper and for points through the Erie Canal, inasmuch as the output by the smaller crafts represented really the manufactured product from the imported asphalts referred to above.

The 53 vessels carrying the tonnage reported above average in draft, loaded, from 19 to 23 feet.

It is fair to say that from this time forward the volume of shipping at Maurer will be largely increased by the opening of our petroleum-products line which eventually will amount to a steamer per week averaging, say, 4,000 to 4,500 tons per trip.

Trusting that the above covers your inquiry, we remain,

Yours, very truly,

J. L. Rake,
General Agent.

Mr. James N. Stout,
Secretary, Staten Island Sound Deep Waterways Association,
New York, N. Y.

LETTER OF MESSRS. FENAILLE & DESPEAUX.

Fenaille & Despeaux,
New York, September 11, 1912.

Gentlemen: In answer to your circular letter of August 27, 1912:

We are owners of property fronting on the Kill Van Kull, and we beg to submit that two channels starting from about the same point in New York Bay and terminating at about the same point in Newark Bay, seems to us, as regards the proposed channel in Raritan Bay and Arthur Kills, a quite wasteful expense, as such a channel will not be required for 50 or 100 years yet, if not more. Everything along its line is quite undeveloped, and exactly the same object could be obtained by prolonging the channel in the Kill Van Kull to Newark Bay, as we believe there is now a channel of 30 feet all the way to Shooters Island, if not somewhat beyond that point; 90 per cent of the tonnage now goes through the Kill Van Kull, and the 10 per cent possibly going through Raritan Bay is that of very light-draft vessels.

We do not at all favor the project as regards the Raritan Bay and Arthur Kills Channel.

Respectfully submitted.

Very truly, yours,

Fenaille & Despeaux,
Per Spire Pitou.

The Board of Engineers for Rivers and Harbors.

LETTER OF THE WARNER CHEMICAL CO.

The Warner Chemical Co.,
New York, September 18, 1912.

Gentlemen: With reference to your communication of August 27 regarding the proposed increase of width and depth of waters around Staten Island, we beg to offer the following facts:

That our incoming tonnage by sailing and steam vessels is about 5,000 tons a year, and that our consumption of coal taken in barges is about 7,500 tons.

We are also finding it more and more difficult as the years go on to charter sailing vessels of small draft to about 1,000 tons capacity of phosphate rock, and in place of these vessels have had to charter steamers and larger sailing vessels, requiring as high as 21 feet of water in channels and at our dock. The vessels of this type generally carry from 2,000 to 3,000 tons of phosphate rock.

It would be of convenience to our business to have the depth of the channels increased to 25 feet.

We do not recommend the Government to increase the depth of the channel to 30 feet, for we believe that it would be impractical to maintain a channel of that depth, for from information which we have in driving piles, we believe that bedrock lies just 30 feet below tide level almost the entire length of the waterway to the west of Staten Island.

We believe that it would be impractical and a waste of time for all vessels drawing from 21 to 25 feet to pass around the north end of Staten Island in order to reach our dock at Carteret, N. J., and we further believe that the normal and natural procedure of a vessel entering the Kill Van Kull in order to proceed to Carteret would be by way of Perth Amboy.

Yours, very truly,

THE WARNER CHEMICAL CO.,
FRANKLIN H. WARNER, *Secretary.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF MESSRS. S. L. MOORE & SONS CORPORATION.

SAMUEL L. MOORE & SONS CORPORATION,
Elizabeth, N. J., September 19, 1912.

SIRS: In regard to the proposed improvement of the Staten Island Sound we wish to strongly recommend this work, believing that it is of the greatest importance, not only to the city of Elizabeth, but to Greater New York.

You will appreciate the growth of shipping and the need for the proper facilities which are essential in fostering our maritime interests. The natural development of waterway for the commerce of this port is along Staten Island Sound, where the proper depth of channel can be obtained. This waterway is destined to become more and more important as it offers an outlet both on the upper and lower bay, it is free of ice throughout the winter, and there are no serious obstructions; the entire waterway is well sheltered and protected; in fact, it is ideal for shipping.

In connection with this there are five trunk lines of roads having their terminals on the Staten Island Sound, and the most progressive steps that can be taken toward the development of the New York Harbor and its contiguous waters would be the deepening of the channel so that vessels of large burden could use it. One of the essential conditions in connection with the handling of commerce is the fact that vessels can navigate the entire length of the sound and take freight direct from the various railroad terminals, thereby avoiding the heavy toll of lighterage which will be incurred for every ton of freight to vessels riding on the water front of New York City, Brooklyn, Bay Ridge, and to a great extent Staten Island.

We hope you will favorably consider the proposed improvements, as we believe it will be of the greatest value to all manufacturing interests in this district.

Respectfully,

FRED CONLIN,
President.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE BARBER ASPHALT PAVING CO.

THE BARBER ASPHALT PAVING CO,
Maurer, N. J., September 20, 1912.

GENTLEMEN: We are in receipt of your notice dated August 27, 1912, regarding the river and harbor act approved February 27, 1911, and in accordance with your specific requests have the following to advise:

(*a*) During the year 1911 the Barber Asphalt Paving Co. discharged 56 steamers and 11 sailing vessels arriving at their dock in Perth Amboy by way of the Raritan Bay and the Arthur Kill. The steamers' draft when loaded ranged from 21 to 25 feet, while the sailing vessels drew from 18 to 22 feet when loaded. The tonnage delivered by the steamers in the above year was approximately 170,000, while the tonnage delivered by the sailing vessels was 15,000.

(*b*) The material delivered by steamers were asphaltic products and crude petroleum, originating from British West Indies, Mexican, and South American ports; while the material delivered in sailing vessels consisted mostly of lumber from southern ports of the United States.

(*c*) The expected increase in commerce with a wider and deeper channel across Raritan Bay would be in the effect that the added facilities would have on manufacturers now operating and on those contemplating desirable locations.

(*d*) We do not believe that if the present project depth of 21 feet through the Arthur Kill is increased to 25 or 30 feet such would benefit those manufacturing concerns below the Rahway River, as the difficulty is not so much encountered in the Arthur Kill as it is in the shallow and irregular course of the channel through Raritan Bay, as at the present the deepest draft vessel that can pass through Raritan Bay at low water in safety is approximately 18½ feet, and in order that deeper draft vessels be able to enter the Arthur Kill it is necessary for them to await high tide, which, of course, delays them materially.

Any plan that does not contemplate the improvement of conditions across Raritan Bay would not be of any benefit to ourselves and other large manufacturing concerns near us.

Yours, very truly,

THE BARBER ASPHALT PAVING CO.,
R. L. FOWLER, *Manager.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE SAFETY INSULATED WIRE & CABLE CO.

THE SAFETY INSULATED WIRE & CABLE CO.,
New York, September 20, 1912.

DEAR SIR: With reference to the improvements in New York Harbor under the river and harbor act approved February 2, 1911, which is to come up for hearing before the Board of Engineers for Rivers and Harbors on September 24, we beg to urge favorable consideration of this matter, particularly as it relates to the widening of the channel in the Kill Van Kull between Shooters Island and New York Bay.

We are situated at the extreme end of Bergen Point, where Newark Bay and the Kill Van Kull meet. The present channel lies approximately 400 feet from our pierhead line, and we are only able to handle boats of any appreciable draft at high tide. Many thousands of tons of material which we now handle by rail could be advantageously handled by water were it possible to reach the channel at other than high tide.

In addition to the ordinary freight, we are one of the largest manufacturers of submarine cable for the War Department, and at a time of war it would be a great advantage for the shipment of this cable were it possible to bring one of the Government cable steamers to our wharf. Up to the present time it has been necessary to lighter such material to the Government vessel at some distant anchorage.

The widening and deepening of the Kill Van Kull channel would also tend to cut down the rapid flow of tides in filling and emptying Newark Bay, thus reducing the hazard to shipping by reason of such currents.

Yours, very truly,

THE SAFETY INSULATED WIRE & CABLE CO.,
LE ROY CLARK, *President.*

Mr. DE WITT BUSKIRK, *Bayonne, N. J.*

LETTER OF WARNER-QUINLAN ASPHALT CO.

WARNER-QUINLAN ASPHALT CO.,
New York, N. Y., September 23, 1912.

GENTLEMEN: Replying to yours of August 24, would say that we are very much interested in the matter of proposed improvement of deepening the channel between New Jersey and Staten Island shores referred to; in fact, all of the waters as proposed in public notice dated August 27, 1912.

We are extending and considerably enlarging the capacity of our asphalt refinery at Warners, N. J.; in fact our inbound tonnage for 1912 by ocean-going tank steamers and sailing vessels will be more than double the tonnage of 1911.

Due to the fact that ocean-going tank steamers now building for the transportation of asphalt, oils, etc., through which source we obtain our crude supplies, are constantly increasing in size and draft, makes it important that the depth of water in the channel between the New Jersey shore and Staten Island be of greater depth in order to accommodate the vessels coming up to and discharging at our refinery.

We are very much interested, as stated, in this proposed improvement and take this means of indicating our hearty approval of same.

Yours, very truly,
C. M. Warner, *President.*

The Board of Engineers for Rivers and Harbors.

LETTER OF THE STANDARD OIL CO.

Standard Oil Co.,
New York, September 24, 1912.

Gentlemen: In accordance with your circular letter, dated August 27, 1912, with reference to deepening of Staten Island Sound, and following request contained in the last paragraph, we respectfully submit replies to the several questions asked therein, together with a list of vessels that have been loaded at various times at our Bayonne plant, a portion of which could be loaded at Tremley and relieve the congested conditions if the improvement of Staten Island Sound is made.

Respectfully, yours,
Standard Oil Co., N. J.,
Geo. B. Gifford.

The Board of Engineers for Rivers and Harbors.

(a) The full-load draft of different types of boats used in the present traffic and comparative amount of commerce carried by each type: 15-foot draft, 2,876,115 tons; 20 to 30 foot draft, 2,505,742 tons.

(b) Character: Crude oil and crude-oil products; coal and miscellaneous articles used in connection with the manufacture and shipment of petroleum products.

Origin: Crude oil received by pipe line from domestic points, also by boat from foreign and domestic points; coal from domestic points; miscellaneous articles from foreign and domestic points.

Amount of commerce carried on vessels having full-load draft of over 20 feet, 733,640 tons; over 25 feet, 1,772,102 tons.

Draft limitations at other points do not affect these shipments, as vessels of corresponding draft are used where port of destination limit the draft of vessels entering same, or the cargoes are lightered there.

(c) If the channel is made 30 feet deep from the New York Bay to Tremley, 550,000 tons of freight now lightered from Tremley would be loaded on vessels drawing approximately 30 feet.

(d) Owing to the narrowness and tortuousness of the channel through the waterway between Staten Island and New Jersey, turning basin would necessitate traversing the channel twice, and, as the present traffic is enormous and constantly increasing, if a 30-foot outlet from Perth Amboy to the sea is not provided congestion will ensue and the growth of the business of the port much retarded.

Case vessels loaded at Standard Oil Co., Bayonne, N. J., year 1911.

Name of vessel.	Length.	Beam.		Draft.		Name of vessel.	Length.	Beam.		Draft.	
	Feet.	*Ft.*	*in.*	*Ft.*	*in.*		*Feet.*	*Ft.*	*in.*	*Ft.*	*in.*
Otterburn	420	52	0	24	7	Crosshill	420	52	0	22	10
Walton Hall	420	50	0	24	5	Kish	420	50	0	25	6
Sandon Hall	412	52	0	26	8	Strathesk	390	52	0	22	9
Neidenfels	430	53	6	24	0	Scharzfels	435	55	0	25	6
Indrawadi	400	48	0	23	7	Marienfels	435	54	9	24	3
Breis Isel	403	50	0	22	9	Dunedin	400	51	9	24	9
Lothian	387	50	5	25	11	Baron Androssan	320	50	0	24	4
Vienna	400	48	6	23	11	Hyndford	386	49	6	24	7
Trautenfels	405	52	6	24	0	Copenhagen	395	52	0	24	3
Liddesdale	386	52	0	22	10	Swazi	396	50	0	22	10
Eskdale	326	40	0	22	0	Maylands	352	52	0	22	10
Lederer	325	49	0	23	10	City of Naples	435	53	0	24	4
Barenfels	432	54	0	24	7	Ben Nevis	380	49	0	21	5
Skarries	383	49	6	23	0	Tennyson	218	37	0	19	11

Case vessels loaded at Standard Oil Co., Bayonne, N. J., year 1911—Continued.

Name of vessel.	Length.	Beam.		Draft		Name of vessel.	Length.	Beam.		Draft.	
	Feet.	*Ft.*	*in.*	*Ft.*	*in.*		*Feet.*	*Ft.*	*in.*	*Ft.*	*in.*
Camphill	370	50	0	22	4	Harcroft	387	47	0	26	7
Adamsturm	417	42	6	22	7	Stotzenfels	438	54	11	21	8
Gloamin	350	50	0	21	8	Falls of Orchy	405	52	0	22	0
Strathyre	300	56	0	23	6	Kybfels	490	51	6	25	2
Harlow	370	48	0	27	6	Clan Maciver	395	50	0	24	4
Vellore	414	52	0	24	9	Bermese Prince	410	54	0	21	2
Baron Polwarth	425	52	3	24	6	Mombassa	385	52	0	24	2
Catharine Park	382	52	0	28	0	Warrior	361	44	0	24	7
Vermont	378	48	0	23	11	Nanette	310	42	0	17	9
Seneca	390	52	0	23	6	Neuenfels	435	55	2	19	10
Baron Dalmeney	366½	48	0	24	8	Lawhill	318	43	0	23	2
River Forth	355	50	0	25	7	Alcides	312	43	0	22	10
Virginia	385	49	6	25	7	Ragna	234	34	0	17	4
Kennebec	420	52	0	24	10	Andromeda	276	40	0	21	10
Iser	275	38	0	21	0	Juteopolis	325	45	0	23	0
Thordisa	280	38	6	19	11	Bourbaki	240	41	0	20	6
Hughenden	245	45	0	21	6	Courbet Admiral	263	36	0	20	6
Strathfillan	387	52	3	21	10	N. Dame d'Arvor	263	40	0	21	5
Dalmore	499	52	0	23	0	V. de'Mulhouse	316	39	0	24	0
Kildale	372	46	0	25	6	Queen Elizabeth	260	40	0	20	8
Gutenfels	438	55	2	21	8	Garnet Hill	279	42	0	22	6
Indra	420	52	0	27	0	Marechal Davout	280	42	0	21	0
Strathord	370	52	3	22	7	Ulrich	300	42	0	22	3

Bulk vessels loaded at Standard Oil Co., Bayonne, N. J., first six months, 1912.

Name of vessel.	Length.	Beam.		Draft.		Name of vessel.	Length.	Beam.		Draft.	
	Feet.	*Ft.*	*in.*	*Ft.*	*in.*		*Feet.*	*Ft.*	*in.*	*Ft.*	*in.*
American	345	44	0	27	7	Iris	295	39	0	....	
Appalachee	340	44	0	25	10	Iroquois	476	60	0	27	9
Aral	310	40	0	24	0	Kura	294	38	0	22	6
Aras	325	43	0	25	8	La Campine	310	39	0	23	0
Lackawanna	352	45	6	26	6	La Flandre	270	38	0	22	6
Aureole	345	47	0	26	4	Le Coq	330	42	6	....	
Bauk Standard	330	43	0	26	4	Lumen	294	38	0	22	10
Balakani	335	45	0	25	6	Lux	283	40	0	20	8
Bayonne	330	42	0	26	0	Mannheim	328	43	0	28	0
Brilliant	318	42	0	27	0	Margaretha	280	37	6	21	8
Buffalo	440	58	6	29	0	Mira	345	47	0	25	8
Bulysses	410	52	0	28	0	Narragansett	512	63	6	29	6
						Navahoe	450	58	0	24	8
Burgermeister Petersen	309	40	0	26	4	New York	428	54	6	29	6
Cadillac	385	51	6	27	6	Ocean	311	39	0	24	0
Capt. A. F. Lucas	360	50	0	....		Oilfield	345	47	0	24	8
Cardium	410	52	0	28	0	Oriflamme	336	46	0	....	
Caucasian	365	49	6	....		Ottawa	309	40	6	24	4
Charlois	310	39	0	23	6	Paul Paix	355	49	0	....	
Chester	312	39	0	25	6	Petroleine	350	48	6	23	9
Cheyenne	389	50	6	26	6	Phoebus	420	53	0	29	6
City of Everett	346	42	0	....		Potomac	345	44	0	26	6
Ciudad de Reus	260	36	0	20	0	Prometheus	428	54	6	29	8
Conrad Mohr	350	46	6	....		Prudentia	312	40	0	20	0
Cowrie	376	48	0	....		Quevilly	322	45	6	....	
Cuyahoga	370	48	0	26	2	Rendova	231	37	0	....	
Delaware	345	44	0	26	6	Rion	279	38	0	22	6
Deutschland	339	43	6	27	0	Rotterdam	360	46	6	27	0
Diamant	329	43	0	26	0	Saranac	386	51	6	27	6
Elise Marie	319	42	0	26	8	Saxoleine	335	45	0	....	
Excelsior	339	43	6	27	9	Spondilus	470	55	0	....	
Geestemunde	309	40	0	25	8	Standard	309	40	0	25	0
Genesee	310	40	0	23	6	Suwanee	310	40	6	24	0
Georgian Prince	328	42	0	22	8	Tonawanda	330	42	6	25	8
Hainaut	249	40	0	19	6	Vedra	345	44	6	24	0
Hesperus	428	54	6	29	8	Willkommen	315	41	0	25	0
Hotham Newton	310	41	0	21	9						

This company has about 38 vessels per year arriving from Tampico, Mexico; Antofagasta, Chile; Valparaiso, Chile; Santiago, Cuba; and Swakopmund, German West Africa.

Statement regarding vessels and cargoes consigned to American Smelting & Refining Co. at Perth Amboy, N. J., 1911.

Date arrival.	Steamer.	Draft fully laden.		Draft loaded to—		Cargo, net tons.
		Ft.	*in.*	*Ft.*	*in.*	
Jan. 14	Hermod	21	6	16	0	2,188
27	Trojan	25	0	23	4	6,000
Feb. 3	Harold	21	6	18	0	3,414
13	Dorothy	23	9	19	6	2,795
Feb. 20	Hemod	21	6	20	6	5,045
Apr. 12	City of Cardiff	22	0	21	0	5,000
Apr. 16	Winnie	20	0	18	6	3,700
23	Monadnock	25	6	21	0	4,805
May 7	Melderskin	24	0	19	0	2,792
15	Ribston	21	5	18	6	4,606
June 2	Kydoma	19	0	14	0	1,518
15	Manchester Inventor	25	8	20	6	3,595

Statement regarding vessels and cargoes of ore and bullion consigned to American Smelting & Refining Co. at Perth Amboy, N. J., during 1910.

Date arrival.	Steamer.	Draft fully laden.		Draft loaded to—		Cargo, net tons.
		Ft.	*in.*	*Ft.*	*in.*	
Jan. 7	Kyleakin	21	6	18	0	3,525
12	Harz	23	0	22	6	5.013
20	Irisbrook	20	6	16	6	3,112
Feb. 2	Shirley	22	8	17	0	1,497
8	Anglo-Mexican	26	0	17	0	1,855
13	Barra	24	0	16	6	1,769
14	Kyleakin	21	6	18	0	3,453
Mar. 3	Hermod	21	6	17	6	2,929
16	Harald	21	6	17	0	2,243
24	Lodoner	23	6	17	0	1,608
Apr. 4	Hermod	21	6	18	0	3,425
22	Metis	23	9	22	0	4,480
23	Harald	21	6	18	0	3,194
May 3	Melderskin	24	0	18	0	3,097
9	Hermod	21	6	17	6	2,529
9	Indianapolis	19	10	18	0	3.530
29	Harald	21	6	18	6	3,884
June 9	Afghanistan	24	6	21	6	4,532
13	Hermod	21	6	17	6	2,972
30	Dorothy	23	9	18	0	2,841
July 9	Harald	21	6	21	6	5,405
12	Otavi	26	0	22	6	4,990
15	Cacique	27	0	19	6	1,424
22	Hermod	21	6	18	0	3,568
Aug. 13	Harald	21	6	18	0	3,220
16	Barra	24	0	21	6	4,741
21	Broomfield	19	8	18	0	2,596
27	Hermod	21	6	17	0	2,381
Sept. 15	Harald	21	6	17	6	2,861
Oct. 2	Hermod	21	6	17	0	1,999
20	Harald	21	6	18	0	3,462
Nov. 5	Hermod	21	6	19	0	4,370
19	Chatham	23	2	19	0	3,368
24	Harald	21	6	18	6	3,666
Dec. 7	Hermod	21	6	18	0	2,947
12	Carl Woerman	24	6	22	0	4,671
27	Harald	21	6	18	6	3,878
31	Mar Rojo	22	10	18	6	2,798

Statement of sailing vessels and their cargoes of ore consigned to American Smelting & Refining Co., Perth Amboy, N. J., during 1911.

Date arrival.	Vessel.	Draft fully laden.	Draft loaded to—	Cargo, net tons.
		Feet.	*Feet.*	
Jan. 24	Loring C. Ballard	13	13	947
Oct. 12	Sullivan Sawin	13	13	1,041
Nov. 11	Thomas W. H. White	7	7	240

LETTER OF THE TEXAS CO.

THE TEXAS CO.,
New York, September 24, 1912.

SIRS: We are especially interested in the improvement of that part of the Kill Van Kull from New York Bay to Shooter Island, including the removal of the middle ground in the entrance to Newark Bay.

While indirectly interested and benefited by all harbor improvements, we believe those most directly interested can best discuss the proposed project for a channel across Raritan Bay and through the Arthur Kill. We are, therefore, confining ourselves to that part of the project which directly affects us, and our answers to your questions have reference to only that part of the project for improving the Kill Van Kull and the entrance to Newark Bay.

(A) During the year 1911 we had the following arrivals and departures of vessels at and from our terminal at Bergen Point.

ARRIVALS.				DEPARTURES.			
Name.	Draft.	Trips.	Cargo.	Name.	Draft.	Trips	Cargo.
	Feet.		*Tons.*		*Feet.*		*Tons.*
Steamship Texas	25	8	43,080	Barge Magnolia	15	8	7,672
Steamship Northwestern	22	2	6,822	Barge Tulsa	14	1	946
Steamship Florida	22.6	6	9,954	Barge Caddo	11	25	18,000
Steamship Northtown	22	3	10,095	Barge Hobson	8	4	1,638
Steamship Louisiana	22	1	3,996	Barge Houston	8	32	7.961
Barge Dallas	18	4	9,784	Power boat Amy B	6	124	1,486
Barge City of San Antonio	17	1	1,479	Power boat Texas Ranger	5	72	27
Barge Harry Morse	22.6	1	1,632	Steam lighter Nina C	16	276	11,748
Total			86,842	Total			49.478

(B) The character of our product is petroleum and its products. Points of loading principally, Port Arthur, Tex., from where we can safely carry 25 feet draft; Tampico, Mexico, from where we can safely carry 22 feet draft; Tuxpam, Mexico, sea anchorage, from where we can safely carry 30 feet draft.

Our ships arriving here loaded deeper than 21 feet 6 inches to 22 feet are lightered to this draft in New York Bay before proceeding up the Kill Van Kull.

We would only expect increased commerce in proportion to increased business. We would, however, use generally a larger type of ship to handle our products to New York, and make a saving of lighterage on some of the product we now handle, thus reducing the delivered cost and increasing competitive possibilities.

It is an undisputed fact that cargo can be carried more economically in large, deeply loaded vessels than in small, light-draft vessels.

Practically all of the new tonnage building is of the large, deep type. Points that can accommodate the large, deep type have the advantage, over other ports, of the widest range of tonnage to draw from and necessarily the cheapest ocean freight rates.

Respectfully submitted:

THE TEXAS CO.,
By W. A. THOMPSON, Jr.,
Manager, Marine Department.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE DEPARTMENT OF DOCKS AND FERRIES, NEW YORK CITY.

DEPARTMENT OF DOCKS AND FERRIES,
New York, September 24, 1912.

GENTLEMEN: Referring to your notice dated August 27, 1912, in the matter of improving the channel in Raritan Bay, Arthur Kill, and Kill Van Kull, upon which you held a hearing to-day, and in accordance with my statement made to you at the hearing that I would file a written communication in the matter, I beg to advise the chief engineer of this department, to whom your notice was referred, reported to me as follows:

"I have secured from the local engineer office approximate data for the proposed improvement, and have placed the lines on the accompanying map. The proposed improvement consists in a channel 1,200 feet wide from the old main ship channel in the lower bay to Tottenville, a channel 400 feet wide in the Arthur Kill and 500 feet wide in the Kill Van Kull.

"The purpose of the hearing is to secure information which will enable the board to decide whether a depth of 25 feet or 30 feet shall be recommended, and whether an essential part of the improvement consists in building a channel across the Raritan Bay from the ship channel to Tottenville.

"Two lines of the proposed Raritan Bay Channel are shown on the map, one following the present 21-foot channel and the other cutting straight across the Flats from Southwest Spit to Great Beds Light. Of these alternate channels the former has the probable advantage of a lower cost of construction and maintenance, and it follows the present natural and developed channel, but is about a mile and a quarter longer than the other, which has the additional advantage of cutting straight across the Flats in one course of nearly 10 miles, and, further, being in the middle of the bay, it would probably suffer much less from ice than the former, which hugs the shore for a distance of about 3 miles.

"It appears to me that this whole proposition, including the Raritan Bay Channel as an essential part, is a very important one to the city and harbor of New York. There can be no doubt whatever that the Arthur Kill in the near future will be one of the greatest manufacturing centers in the country, many important concerns having already located along its westerly shore, including the Standard Oil Co., Grasselli Chemical Co., Armour & Co., and a great many others, while the city of Perth Amboy is rapidly increasing in importance, both as a manufacturing and shipping center. On the east side of Arthur Kill Tottenville at the southerly end is assuming importance as a boat building center, and in addition it contains the rapidly growing plant of the Atlantic Terra Cotta Co.; to the north there are a number of industries, the Kreischerville Brick Co. at Kreischerville and the Richmond Brick Co. at Rossville, the linoleum factory at Linoleumville, and the Antimony Refinery at Chelsea. Furthermore, the city has laid out a very large plan of improvement at Fresh Kills, stretching more than one-half way across the island to the village of Richmond and north to Springville, in the center of a very important truck farming community. It is expected when this plan is carried out and railroad facilities are provided for the west shore of Staten Island that a greatly increased activity in manufacturing will be found all along this shore. The improvement of the channel on the lines proposed will make the approach from the ocean to this shore very direct and safe and would assist very materially in its development.

"The Kill Van Kull on both the Staten Island and New Jersey sides is already of very great importance as a manufacturing center, the Singer Manufacturing Co. at Elizabeth, Proctor & Gamble's Soap Works, and Milliken Bros. Steel Works at Howlands Hook, the Hecker-Jones-Jewell Flour Mill at Mariners Harbor, the Standard Varnish Works and the American Linseed Oil Works at Elm Park, the National Lead Co. at Port Richmond, King's Plaster Mills at New Brighton, on the Staten Island shore; Babcock & Wilcox Boiler Works, the Tidewater Oil Co., the American Smelting & Refining Co., and the Pacific Coast Borax Co. at Bayonne, being only a few of the largest concerns along this waterway. There can be no doubt whatever that an increased depth of channel would result in lower costs of production for many or most of these concerns, and would be a great inducement to offer to manufacturing concerns contemplating a location along the water front in the vicinity of New York.

"The water front bordering on this improvement is one of the few places in the vicinity of New York where large properties suitable for manufacturing purposes on deep water can be had without excessive cost, and without the difficulty attending the gathering together of several small parcels in order to secure an area sufficiently large for a great manufacturing plant, and it will be undoubtedly to the interest of New York City in general to push forward this improvement with all the means in its power. It is our main purpose to develop property within the city rather than just outside, and this channel will undoubtedly do much toward developing a great area within the city limits on the west shore of Staten Island, which is now practically undeveloped, and a great part of which is worthless except for manufacturing purposes, being too low and too inaccessible to make it of any use for residence purposes at any time within which it would be possible to make any predictions whatever."

After carefully considering the report of the chief engineer I concur therein, and take this opportunity to advocate the scheme in its entirety and to the extreme depth limit. I strongly urge the improvement. In the event of its being carried out, either to 25 feet or to 30 feet, but preferably to the greater depth, I will endeavor to advance the improvement of the west shore of Staten Island by the city, and particularly the proposed Fresh Kills terminal plan.

Yours, very truly,

CALVIN TOMKINS,
Commissioner of Docks.

TO BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE SINGER MANUFACTURING CO.

THE SINGER MANUFACTURING CO,
Elizabethport, N. J., September 30, 1912.

GENTLEMEN: The requirements of shipping facilities for the port of New York by reasons of the Panama Canal are so evident to this board that it hardly seems necessary to go at length into the details of the harbor's requirements to meet this condition, and yet our requirements and conditions for shipping are such that we think that we must by necessity take this subject as the basis of our contentions.

At the moment we are shipping to China, Japan, and the Philippines a heavy tonnage monthly, amounting in round numbers to about 2,000 tons, and this particular field is greatly on the increase, and with the opening of the Panama Canal this business is going to increase greatly in volume, in that much of this territory now being supplied by other factories of this company will be transferred to this point by reason of the canal possibilities.

Our method for caring for this large volume of business is by overland to the Pacific coast and thence by steamer to destination or by an all water route via Cape Horn, a route that is in itself expensive and unprofitable, because of the great length of time required not only for the China, Japan, and Philippines trade, but for the west coast of South America, where we require to deliver a heavy tonnage monthly, and in this latter territory the canal is going to be a very important factor in promoting trade, and it follows a big increase in the volume of shipments now being delivered.

To care for this business we are dependent entirely upon one railroad, not only for the delivery of practically all raw material, but for the shipment of our finished product and supplementing this means of transportation we employ three light draft steam lighters with an average carrying capacity of about 175 tons gross, the size of which is limited by the waterways which we must by necessity traverse to reach our docks, and it must be remembered that by these limited means we must move considerably over 200,000 tons annually, certainly a condition not commensurate with a concern having about 8,000 employees and a pay roll of something like $6,000,000 annually.

In the proposed improvement of Staten Island Sound by broadening and deepening, a waterway would be available for the modern ocean going vessels and make possible the shipping facilities which the increased demand of trade warrants, by reason of the canal, namely, that of being able to bring directly to our docks vessels for the eastern trade and loading them for direct shipment. Further, this improved channel brings about the possibility of our enjoying other railroad connections by harbor methods as an outlet for our freight traffic, both incoming and outgoing, so that we would be relieved of being entirely dependent upon one railroad for the conduct of our business.

Finally, we trust that this board will give due consideration to this project under consideration, and recommend improvements in Staten Island Sound in keeping with not only the immediate needs, but those of the future.

Yours, very truly,

THE SINGER MANUFACTURING CO.
Per DE WITT VAN BUSHIN, *Attorney.*

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF THE AMERICAN LINOLEUM MANUFACTURING CO.

THE AMERICAN LINOLEUM MANUFACTURING CO.,
New York, September 30, 1912.

GENTLEMEN: Supplementing the remarks of our Mr. John B. Pearson at the public hearing held at the Chamber of Commerce, 65 Liberty Street, New York City, on September 24, 1912, we desire to offer for the consideration of your honorable board the following:

We employ from 850 to 900 hands in the production of linoleum floor cloth at our factory situated at Linoleumville, Staten Island, a point just south of the Rahway River, and opposite Carteret, N. J.

All our raw materials and finished goods are received and shipped by water from the factory dock, through the Arthur Kills, to points within the harbor of New York.

Our business has increased from year to year, and during the past 12 months the freight of raw materials and manufactured goods handled in and out of our plant has amounted to 54,400 tons.

While we favor the maximum improvement suggested for the depth of the channel, we are more particularly interested in the proposed increased width, as in front of our property the channel is entirely in the State of New Jersey, consequently we are placed at a decided disadvantage.

At a hearing held in New York City it was clearly shown that small coal barges were fast being put out of commission in favor of those of a much larger size. At the present time we can only use coal barges of a capacity of about 300 tons, and freight boats drawing 9 feet light, and even these are often in the mud and have to be timed to get in the dock.

A northwest wind with an ebb tide drives the water out of the sound to such an extent that even these light-draft boats are often in the mud, consequently we have constantly to pay large sums for demurrage.

In winter we have to keep a small channel open from the present channel to our dock, and in this small channel we are greatly troubled with pack ice.

We therefore ask your honorable board to widen the channel at this point toward the Staten Island side; and we also beg of you to remove the sand or mud bank that lies directly in front of our dock, and between it and the channel. We certainly feel that this would be a great improvement, not only to ourselves, but to everyone interested in shipping through the Arthur Kills.

Yours, very truly,

The American Linoleum Manufacturing Co.
Chas. F. Cartledge, *President.*

The Board of Engineers for Rivers and Harbors.

Letter of the Oakland Chemical Co.

The Oakland Chemical Co.,
New York, October 3, 1912.

Gentlemen: We understand that at the public hearing held on September 24 at the Chamber of Commerce in New York City, on the matter of the proposed widening and deepening of the channel between New Jersey and Staten Island, notice was given that further statements of facts in connection with this project would be received by your department in writing during the current week.

The Oakland Chemical Co. is the owner of a plant, located on the water front at Smoky Point, near Rossville, Staten Island. This plant is 3½ miles from the tracks of the Staten Island Rapid Transit Railroad, which is the nearest rail connection, so that all of the material used is received and all the output of the plant shipped by water. During the winter months it is at times difficult, if not almost impossible, to bring boats to its dock on account of the ice which collects along the Staten Island shore. We are advised that, if the channel is widened to 400 feet as proposed, the sharp turns in the channel will be removed and the ice will have freer movement in either direction with the tide, and so lessen in a great degree the difficulties from this cause we have had to contend with in the past.

There is much land on the Staten Island shore that would be available for factory sites if it was accessible; the channel as it now exists is much closer to the New Jersey shore, and if the proposed widening would make it easier to get to the shore on the Staten Island side there would be a greatly increased occupation of the land. On the New Jersey side railroad facilities are at hand in most of the area, whereas the absence of such facilities on the Staten Island side has made manufacturers who located there entirely dependent on the water transportation. This has left a relatively large area vacant which would undoubtedly be taken up if by reasonable dock building deep water could be reached.

We are not vitally interested at present in the question of the depth as between 25 and 30 feet, but the further enlargement of the plant may in the near future make some increase in the depth of the channel of the utmost importance to us.

We therefore respectfully urge:

First. That the channel be deepened and widened.

Second. That the widening be carried out on the Staten Island side as far as practicable.

Sincerely,

The Oakland Chemical Co.,
Per Daniel E. Rianhard, *Manager.*

The Board of Engineers for Rivers and Harbors.

LETTER OF THE STATEN ISLAND SOUND DEEP WATERWAYS ASSOCIATION.

STATEN ISLAND SOUND DEEP WATERWAYS ASSOCIATION,
New York, October 5, 1912.

GENTLEMEN: I beg to inclose herewith for your attention the following letters and statements relating to the proposed improvement by the Government of the channel between Staten Island and New Jersey and its approaches, viz:

Letter, New York Lubricating Oil Co., dated September 18, 1912.
Letter, Armour & Co., dated September 21, 1912.
Letter, American Agricultural Chemical Co., dated September 24, 1912.
Letter, Pennsylvania Railroad Co., dated October 5, 1912.
Statement, United States Metals Refining Co.

I am also inclosing a table of the population of New York City compiled in 1908 by Joseph Caccavajo, who estimates that the population of New York City in 1930 will approximate 9,800,000. It is estimated that the present population of the commuting area of New York City, which includes the shores of Staten Island Sound and its approaches, is upward of 7,000,000, and, unless the present growth of the population in this area is retarded, by the time the Government finishes dredging this waterway to 30 feet the population of the commuting area in question will be close to 15,000,000. While the city of New York is growing rapidly, some of the towns included in the commuting area of New York are doubling in population every decade, and the commercial requirements of this vast population should increase proportionately; therefore, while this waterway is of national importance, its local importance is very great.

Respectfully yours,
JAMES N. STOUT,
Secretary.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

LETTER OF NEW YORK LUBRICATING OIL CO.

NEW YORK LUBRICATING OIL CO.,
New York, September 18, 1912.

DEAR SIR: I beg to acknowledge receipt of your favor of the 12th instant, inclosing copy of a letter from the War Department in regard to the work in New York Harbor.

The only points that I would have to offer which would be of any force in this matter would be the citation of two instances where we loaded vessels with a solid cargo for our account, and, because of insufficient water at our own dock on Arthur Kill, we were compelled to lighter the cargo to the vessel. Because of this fact we were compelled to give up all idea of making cargo shipments regularly.

It seems to me that this would be the kind of information that would have the most weight in presenting the situation to the board, who will have the matter under consideration for the Government. The two particular instances which I have in mind, as above mentioned, are the sailing vessel *Alcarita*, which we loaded with our products for shipment to South Africa, and the steamship *Queen Adelaide*, which we loaded also for South African ports.

This company, in combination with its foreign interests, purchased the steamship *Queen Adelaide* to ply regularly between this port and foreign ports, where we have agencies. The *Queen Adelaide* was lost on her first voyage, but, as we had shown a determination to operate our own vessels, unless we were accorded what we believed to be only fair treatment by the ocean carriers, we were enabled to secure freight rates which made it more advantageous to ship by common carriers than would have been the cost of transportation in operating our own ships if we had to load by means of lighters. In consequence of which we did not deem it advisable to purchase other vessels to replace the *Queen Adelaide.*

The reasons which first inspired us to purchase and operate our own ships might again exist, however, and, if such should be the case, we would be in far better shape to protect our interests if we were able to load ships at our own dock instead of being compelled to incur the very considerable additional cost of lighterage.

This strikes the writer as being a very pertinent issue in the protection of American manufacturing interests against foreign-owned shipping.

I note that the date upon which the board of engineers will hold a hearing in regard to this matter is September 24, at 11 o'clock a. m. This is the same day and hour as the monthly meeting of the board of directors of this company, and, as the meeting this month will be quite an important one, it does not seem now as though the writer or any other director of this company would be able to attend the hearing unless the hearing should be continued after noon.

The information that I am giving you in this letter, however, is sufficiently substantial as to facts, and would, the writer believes, be just as forceful if presented in writing as though it were argued verbally.

I would like to have your opinion upon the subject and would like to have your advices as to the best form in which to present the facts herewith given, if you think it would require any more detailed statement than that which is here given.

Yours, very truly,

New York Lubricating Oil Co.,
Philip Harrison, *Secretary.*

Mr. James N. Stout,
Secretary, Staten Island Sound Deep Waterways Association,
New York, N. Y.

LETTER OF MESSRS. ARMOUR & CO.

Armour & Co.,
New York, N. Y., September 21, 1912.

Sir: Referring to your communication of the 10th instant in re public hearing September 24 before the Board of Engineers for Rivers and Harbors, it is the intention of the writer to be present at this hearing. If you will make up any statistics to present, as secretary of the association, you will please be advised that our inbound tonnage to our plant at Chrome is carried in foreign steamers from Tampa, Port of Tampa, Spain, and South America. These steamers draw from 24 to 28 feet and carry about 38,000 tons annually. About half of the tonnage is received in vessels drawing over 25 feet.

Outbound tonnage via steamers and schooners draw from 18 to 26 feet, averaging 30,000 tons annually. About one-third of this tonnage goes out in vessels drawing over 23 feet. Therefore it is essential that we have sufficient depth of water to accommodate this tonnage.

Yours, very truly,

Armour & Co.,
James F. Price,
Manager.

Mr. Jas. N. Stout,
Secretary, Staten Island Deep Waterways Association,
New York.

LETTER OF THE AMERICAN AGRICULTURAL CHEMICAL CO.

The American Agricultural Chemical Co.,
New York, September 24, 1912.

Dear Sir: Your valued favor of September 10 duly received, attached to which was public notice issued by the War Department dated August 27, 1912. Same has been carefully noted.

With reference to the business of this company, beg to state we have answered questions A and B together as follows:

	Number of trips.	Average draught.	Tons.	Value.
Steamers	66	17½ to 21 feet		
Sailing	295	15 to 18 feet		
Barges and canals	290	6 to 13 feet		
Power boats	21			
Total	672		328,973	$6,453,880

This covers fertilizer and fertilizer materials.

(C) A 30-foot channel would permit of vessels reaching our docks that can not now do so, hence cargoes have to be lightered.

Trusting the above information is what you desire, we are,

Yours, truly,

Wm. Prescott,
Vice President.

Mr. J. N. Stout,
Secretary, Staten Island Sound Deep Waterways Association,
New York, N. Y.

LETTER OF THE PENNSYLVANIA RAILROAD CO.

THE PENNSYLVANIA RAILROAD CO.,
New York, October 5, 1912.

DEAR SIR: Referring to my remarks before the United States Board of Engineers for Rivers and Harbors at the hearing held in the chamber of commerce September 24, it refers more particularly to our towing business to and from South Amboy.

The channel between Great Beds Light and South Amboy not being as deep as the remainder of the route between there and New York, our towing from New York to South Amboy is by flotillas of boats. We have taken in one tow as many as 73 boats. We, therefore, tow with the tides. This brings us when bound for South Amboy at the tail of Great Beds, Raritan Bay, at low tide; hence, our towing by these flotillas between the tail of Great Beds and South Amboy is done at dead low tide. In the opposite direction our flotillas or tows leave South Amboy on the very last of the ebb tide in order to get the first of the flood from the tail of those beds en route for New York. This limits the draft of vessels that we can use or have in these flotillas or tows to ordinarily 15 feet, but on an easterly wind or extraordinarily high low tide we have negotiated the channel with boats in the tow drawing as much as 18 feet. These are the 18-foot boats that I referred to in my remarks, and because of this condition, we do not often attempt to tow in that narrow or comparatively shoal channel boats of more than 15 feet. If the channel is deepened, say to 30 feet, all new boats constructed for navigation of it and employed in this South Amboy trade will unquestionably be increased in depth of hold because of the more economical handling of traffic loaded in boats carrying greater tonnage.

Yours, truly,

D. C. CHASE,
Superintendent of Steam Towing.

Mr. JAMES N. STOUT,
Secretary, Staten Island Sound Deep Waterways Association, New York, N. Y.

STATEMENT ON BEHALF OF THE UNITED STATES METAL REFINING CO.

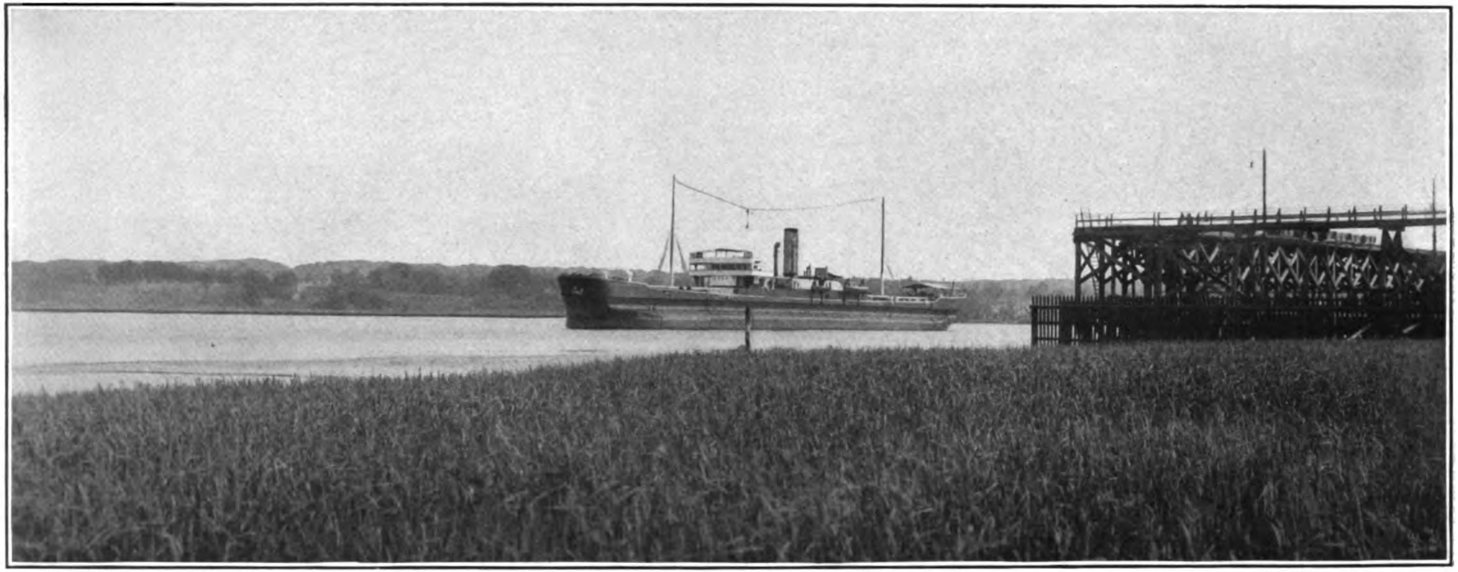
On behalf of the United States Metals Refining Co., we submit the following memorandum in favor of the project for the dredging of the Kill Van Kull:

Location of our plant.—The United States Metals Refining Co. conducts a plant for the refining and smelting of copper ores at Chrome, N. J., which is situated on the westerly shore of the Kill Van Kull, on the New Jersey side, between Carteret and Perth Amboy. The place was known on the old maps as the Blazing Star Landing.

As to our trade.—The department of our trade which is especially affected by the question of a deep waterway is our importation from foreign countries of copper ores to be smelted at our plant. These ores, up to very recently, have come from European ports and from Cuba, and it became practically impossible to develop that trade until the United States War Department granted the privilege of extending our pier some 130 feet, thereby enabling us to dock vessels of a draft of 22 feet.

The limit of draft for vessels which we can safely employ in this trade now, even with the extended pier, is 22 feet. It would be easy for us, in the ports of shipment, to obtain transportation in vessels of greater draft, but we now have to make a special effort and find a vessel in these foreign ports of not more than 22-foot draft, and in employing these vessels we have to pay a greater amount of freight than would be necessary if we could use vessels of greater draft. In most cases we are driven to the expedient of employing vessels of 24-foot draft and loading them lightly, thereby putting us to considerable expense and in other cases we load them with other freight which can be unloaded at New York City and then the vessel, thus lightened, may be sent to our pier. This involves an expense of $750 per vessel. In other cases, where it has been necessary to load the vessel entirely with our ores, we are compelled to lighter part of the load to our docks before the vessel can enter.

The foregoing statement applies especially to importations from Europe and Cuba. A special difficulty arises in regard to importations from South America. That continent is becoming the principal field for the production of ores, and it is of the utmost importance that the United States now, at the outset, should not be hampered in bidding for this trade. At the present time, the United States receives about 50 per cent of the ore productions of South America, of which 40 per cent is taken by our company. By reason of the length of the voyage from the western coast of South America so much bunker space is required for coal that small vessels can not engage in this trade, and vessels of 28 feet is the minimum draft that can be obtained



S. S. COUNTESS WARWICK AGROUND OFF CHROME, N. J., 1912.

for the shipment of these ores. We are now driven to the necessity of lightering a part of the vessel's freight or of unloading other freight at New York City before the vessel proceeds to our dock. As stated above, this involves a serious charge against this business. The smelting of ores is now done on a narrow margin of approximately $1 per ton profit, and every additional expense for freight crowds the business to the limit of profitableness. The German and English smelters already enjoy an advantage in freight rate, being compelled to pay from 20 to 25 shillings, while we are compelled to pay from 25 to 30 shillings, and if to this excess of freight charge is to be added an additional charge for lightering or for a partial unloading on account of inadequate water facilities we will be driven out of this business.

Ports of shipment.—The ports from which these ore shipments are made either have adequate depth of water for vessels of 28 and 30 feet draft or the vessels are loaded by a lighter. The principal port of shipment to-day in Europe is Huelva, Spain, with fine harbor and dock facilities and an abundant depth of water. The South American shipments are for the most part loaded at Callao and Santiago, and are loaded by lighter. At all of these ports plenty of vessels are offered of 28 and 30 feet draft, but we are hampered in having to await an opportunity to employ a vessel of lesser draft before our shipments can be made and for which we have to pay a greater rate of freight, and in the South American trade it is impossible to obtain vessels of less than 28 feet draft.

The turning basin.—We believe that this is impracticable. The volume of trade in the Kill Van Kull is already of such proportions that a through waterway is demanded. This trade is now growing at a tremendous rate. In 1899 this trade was 11,300,000 tons; in 1911 it had developed to 30,500,000 tons, the cargoes being valued at upward of five hundred million. The volume of this trade can be better appreciated by a comparison. The traffic of the Hudson River is approximately 17,000,000 tons a year, of the Suez Canal 16,000,000 tons, and the traffic of the Kill Van Kull is now 30,500,000 tons per year, practically equal to that of the Hudson River and Suez Canal combined. If a turning basin is constructed, a substantial portion of this traffic must twice traverse the Kill Van Kull, and hence we will have a traffic exceeding that of the Hudson River and Suez Canal combined in a narrow channel of from 400 to 500 feet in width. Much of this traffic also is accomplished by means of towing and its consequent large flotilla. We therefore respectfully urge that the construction of a turning basin requiring a return passage of vessels would inevitably result in congestion, delays, accidents, and an impeding of traffic.

The project of national as well as local importance.—First. This deepened waterway would be of value for naval purposes as an inland route between New York Harbor and Raritan Bay, and when the New Jersey project for a deep-water canal from the Delaware River to Raritan Bay is constructed an inland waterway will be available for naval purposes from New York Harbor to Delaware Bay.

Second. All the great trunk lines of railroad, except the New York Central and New York, New Haven & Hartford, have terminals on the shores of this waterway, and practically all of the States of the Union, in greater or less degree, will receive from a deepening of this waterway some benefit.

Respectfully submitted.

REEVES & TODD.

On behalf of—

THE UNITED STATES METALS REFINING COMPANY.

The following photograph, recently taken, shows the difficulties now encountered. The *Countess of Warwick*, 21½ feet draft, is aground, showing her signals of not being under control.

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

Population New York City.—Present area (five boroughs), 1790–1950.

[Compiled 1908 by Joseph Caccavajo, consulting engineer. 1790–1900 United States Census reports. 1910–1950 estimated.]

Year.	New York City, five boroughs. Area: Total, 209,218 acres; available, 172,000 acres).					Borough of Manhattan. Area: Total, 14,038 acres; available, 12,000 acres).				
	Population.	Increase.	Per cent increase.	Population per acre.		Population.	Increase.	Per cent increase.	Population per acre.	
				Based on total acreage.	Based on available acreage.				Based on total acreage.	Based on available acreage.
1790	49,401	......	......	......	......	33,131	......	......	2	2
1800	79,216	29,815	60	......	......	60,515	27,384	83	4	5
1810	119,734	40,518	51	......	......	96,373	35,858	59	7	8
1820	152,056	32,322	27	......	......	123,706	27,333	28	9	10
1830	242,278	90,222	59	1	1	202,589	78,883	64	14	17
1840	391,114	148,836	61	2	2	312,710	110,121	54	22	26
1850	696,115	305,001	78	3	4	515,547	202,837	65	36	43
1860	1,174,779	478,664	69	6	6	813,669	298,122	58	58	68
1870	1,478,103	303,324	26	7	8	942,292	128,623	16	67	78
1880	1,911,698	433,595	29	9	11	1,164,673	222,381	24	83	97
1890	2,507,414	595,716	31	12	14	1,441,216	276,543	24	102	120
1900	3,437,202	929,788	37	16	20	1,850,093	408,877	28	132	154
1910	4,810,000	1,372,798	40	23	28	2,250,000	399,907	22	160	190
1920	7,000,000	2,190,000	45	34	40	2,500,000	250,000	11	178	208
1930	9,800,000	2,800,000	40	47	57	2,500,000	......	......	178	208
1940	13,700,000	3,900,000	40	65	80	2,250,000	[1]250,000	[1]10	160	190
1950	19,250,000	5,550,000	40	92	112	2,000,000	[1]250,000	[1]11	142	167

Year.	Borough of Brooklyn. Area: Total, 49,680 acres; available, 40,000 acres).					Borough of Bronx. Area; Total, 26,017 acres; available, 20,000 acres).				
	Population.	Increase.	Per cent increase.	Population per acre.		Population.	Increase.	Per cent increase.	Population per acre.	
				Based on total acreage.	Based on available acreage.				Based on total acreage.	Based on available acreage.
1790	4,495	......	......	......	......	1,781	......	......	......	......
1800	5,740	1,245	28	......	......	1,755	*26	......	......	......
1810	8,303	2,563	45	......	......	2,267	512	29	......	......
1820	11,187	2,884	38	......	......	2,782	515	23	......	......
1830	20,535	9,348	84	......	......	3,023	241	9	......	......
1840	47,613	27,078	132	......	1	5,346	2,323	77	......	......
1850	138,882	91,269	192	2	3	8,032	2,686	50	......	......
1860	279,122	140,240	101	6	7	23,593	15,561	195	......	1
1870	419,921	140,799	50	8	10	37,393	13,800	59	1	1
1880	599,495	179,574	43	12	15	51,980	14,587	39	2	2
1890	838,547	239,052	40	17	20	88,908	36,928	71	3	4
1900	1,166,582	328,035	39	23	29	200,507	111,599	126	8	10
1910	1,700,000	533,418	46	34	42	480,000	279,493	139	18	24
1920	2,500,000	800,000	47	50	62	1,000,000	520,000	108	38	50
1930	3,500,000	1,000,000	40	70	88	1,770,000	770,000	77	68	88
1940	5,000,000	1,500,000	43	100	125	2,770,000	1,000,000	57	106	138
1950	7,000,000	2,000,000	40	140	175	4,000,000	1,230,000	44	153	200

[1] Indicates decrease.

Population New York City.—Present area (five boroughs), 1790–1950—Continued.

Year.	Borough of Queens. Area: Total, 82,883 acres; available, 70,000 acres.					Borough of Richmond. Area: Total, 36,600 acres; available, 30,000 acres.				
	Population.	Increase.	Per cent increase.	Population per acre. Based on total acreage.	Population per acre. Based on available acreage.	Population.	Increase.	Per cent increase.	Population per acre. Based on total acreage.	Population per acre. Based on available acreage.
1790	6,159	......	......	......	......	3,835	......	......	......	......
1800	6,642	483	8	......	......	4,567	732	19	......	......
1810	7,444	802	12	......	......	5,347	780	17	......	......
1820	8,246	802	11	......	......	6,135	788	15	......	......
1830	9,049	803	10	......	......	7,082	947	15	......	......
1840	14,480	5,431	60	......	......	10,965	3,883	55	......	......
1850	18,593	4,113	28	......	......	15,061	4,096	37	......	......
1860	32,903	14,310	77	......	......	25,492	10,431	68	......	......
1870	45,468	12,565	38	......	......	33,029	7,537	30	......	1
1880	56,599	11,131	24	......	......	38,991	5,962	18	1	1
1890	87,050	30,451	54	1	1	51,693	12,702	33	1	1
1900	152,999	65,949	76	2	2	67,021	15,328	30	1	2
1910	300,000	147,001	96	3	4	80,000	12,979	19	2	2
1920	900,000	600,000	200	10	12	100,000	20,000	25	2	3
1930	1,900,000	1,000,000	111	23	27	130,000	30,000	30	4	4
1940	3,500,000	1,600,000	84	42	50	180,000	50,000	38	5	6
1950	6,000,000	2,500,000	71	72	86	250,000	70,000	39	7	8

The most important problem confronting the citizens and officials of New York City to-day is how to provide adequate transit facilities to meet not only urgent present needs, but the ever increasing demands of all sections of the city.

In order that consulting engineer Caccavajo might prepare the tentative plan for a comprehensive system of subways and rapid transit lines for the five boroughs of Greater New York, which was submitted to the Public Service Commission in April, 1908, the future growth of the city in population had necessarily to be anticipated, and it was for this purpose that the above estimates were prepared.

The acreage figures given are land areas only. The available acreage is arrived at by deducting the areas of parks and cemeteries, and in Brooklyn, Queens, and Richmond the area of swamp lands is also deducted.

That the population of Manhattan will decrease is beyond dispute. Within a very few years there will be practically no residential population south of Fifty-ninth Street, leaving less than 5,000 acres to house the residents of the borough, or an average of more than 500 persons to the acre.

The rapid progress uptown of business buildings points to an early and much to be desired solution of the city's great social problem, the congested east side tenement districts, as within a decade the property south of Fourteenth Street and probably south of Thirty-fourth Street will have become too valuable for use for residential or tenement house purposes.

Staten Island, with an available area half again as large as the Bronx, a magnificent water front ready for development, and the highest land along the Atlantic coast from Maine to North Carolina, should have 10 times the population shown above if rapid and reliable means of transit are provided connecting it with Brooklyn and Manhattan.

There are hundreds of acres in Manhattan to-day with more than 1,000 people, and in some sections of the borough there are nearly 2,000 to the acre. This is congestion, but there are thousands of acres with 500 to the acre that can not be considered congested.

With an average of 500 to the acre New York City would have a population of nearly 100,000,000. This is not a prognostication but merely another illustration of the immense amount of territory lying within the present city limits.

Considering the growth of the city, as shown above, during the past 100 years, it seems reasonable to say that an average of 92 persons to the acre in the Greater City in 1950 is a conservative estimate.

The only thing that can seriously retard the growth and prosperity of New York City will be the failure to provide proper transit facilities.

PLANS FOR A NEW STEAMSHIP TERMINAL IN NEW YORK HARBOR.

[By H. McL. Harding, Consulting Engineer.]

On account of the congestion along the water front of the island of Manhattan there are now some 33 companies unable to obtain berthing facilities, and it is necessary that other locations at the port of New York be found where large terminals can be advantageously situated.

It is essential that at a place to be selected for such a terminal it should be possible to successfully fulfill all the requirements of a modern terminal, so as to secure rapidity and economy of transference, and that it should be in every respect a transshipment terminal. It should not be chiefly a railway terminal with classification yards, transfer and distributing yards predominating, but a combination of all that make up a correctly planned terminal, with all the elements properly proportioned. Not only must provision be made for the foreign and coastwise commerce, but also for the transcontinental and intercoastal commerce.

In addition, there are the fast-freight export shipments, now becoming so important, which give emphasis to the necessity for the rapid handling of freight at any terminal.

As discussed at the last International Congress of Navigation, held in Philadelphia in May and June of this year, it was recognized that a terminal consisted of a number of important elements, none of which could be dispensed with if the terminal was to be able to compete successfully with other cities for the ever-increasing foreign and domestic trade. A terminal must have all its elements coordinated or tied together—that is, the warehouses, industrial sections, railroad tracks, the outbound and inbound houses, each with their respective tracks and platforms; the transfer station, classification yards, car-storage yards with ample placement tracks supplementing the transfer station; then the sheds rearward of the piers, the piers, wharves, and the latest type of transit sheds, and all of these connected by such standard mechanical transferring appliances as have proved most successful.

Location.—As the through or commercial traffic inland, even to the Middle West, including the domestic as well as the foreign, comprises a large proportion of the total freight handled in New York Harbor, a terminal to provide for this must be so arranged that the freight can be transferred, as far as the character of the freight will permit, directly between the vessel and the car, thereby avoiding the expense of rehandling by manual labor, of lighterage, which costs 60 cents (2/6) or more per ton, and of high land rental or interest, which must be charged to every ton. The reduction in the expense for manual labor alone for this transference will be about 20 cents (0/10) per ton. There is also a possible saving, due to the rapidity of transference, in the charter value of steamships, estimated at 12 cents (0/6) per ton. If all the possible economies can be effected, there will be a positive saving of 60 cents (2/6) lighterage, plus 18 cents (0/9) pier rental, plus 20 cents (0/10) mechanical transferring, plus 12 cents (0/6) charter value saving in time, making a total saving of $1.10 (4/7) per ton.

To eliminate the lighterage charges for this through or commercial freight, the terminal can be located most advantageously on the mainland of New Jersey, but not in such places as would require bridges or long trestles near the terminals to connect with the west, and not on wholly or partially submerged Government or State lands. There must also be the possibility of connecting with two or more competing railways.

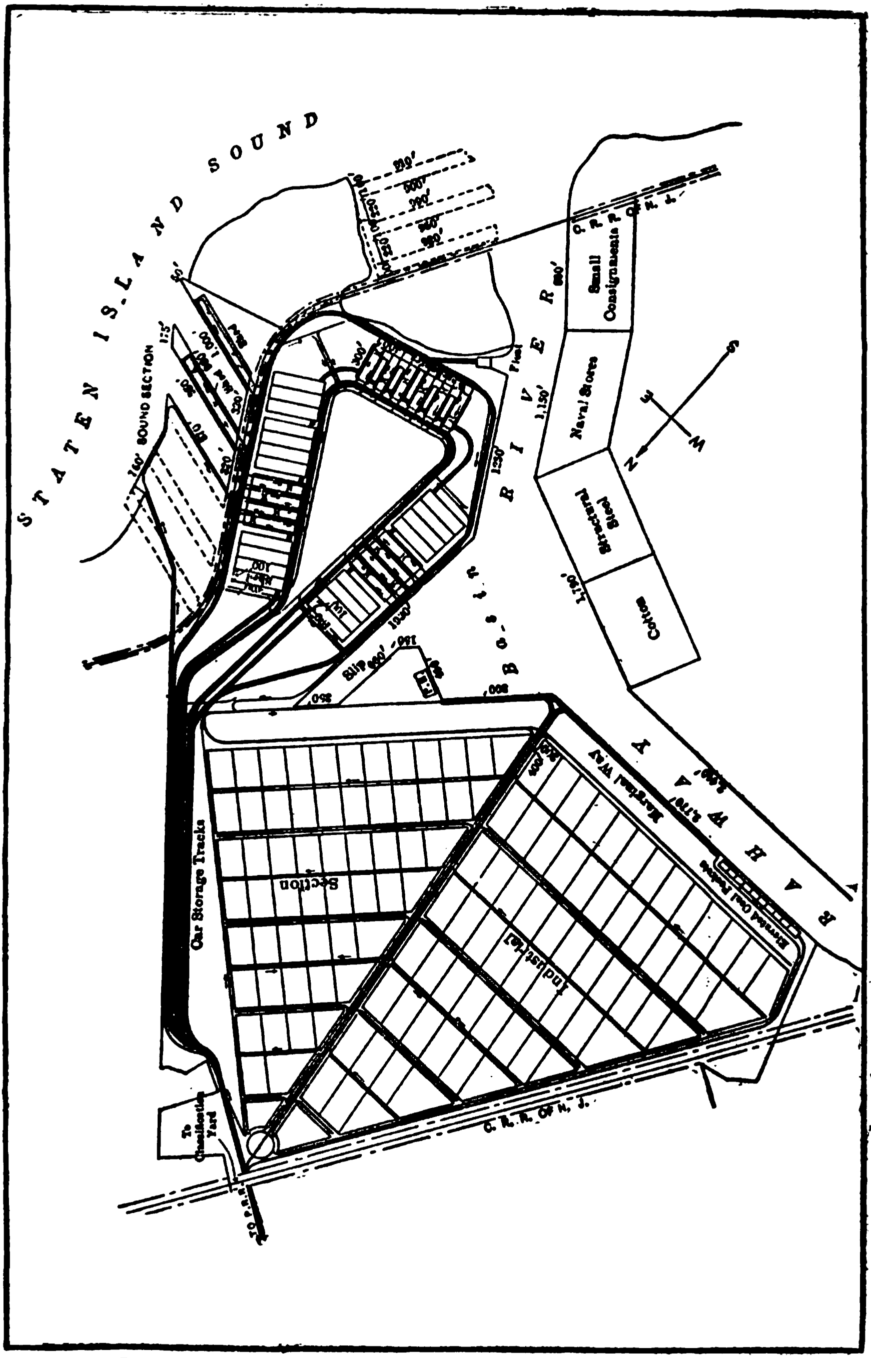
At first it seemed impossible to satisfy all these conditions, but finally, after much difficulty, between 900 and 1,000 acres were purchased on the mainland of New Jersey at the junction of the Staten Island Sound and the Rahway River, and plans have been prepared for the erection there of a modern steamship terminal to be known as the Montgomery Terminal. The site is about midway between the Raritan Bay and the Kill Van Kull and to the west of Staten Island, thereby securing a protected waterway either to the north or to the south.

The width of Staten Island Sound opposite the Montgomery Terminal is about the same as the Thames at London, and by dredging the point of an island now controlled by the terminal a width of nearly half a mile can be secured. Below the terminal the sound gradually widens.

Through this sound there passes a traffic of nearly 30,000,000 tons annually. There is a depth of 21½ feet at low water and above 26 feet at high water.

Capacity of terminal.—As planned, there will finally be a track capacity pertaining to the terminal of not less than 30 miles and a car placement of some 3,000 cars. This trackage will include the distributing leads, storage tracks, and sidings.

The transferring capacity per lineal frontage of quay or pier wall, as planned, provides for not less than 4,000,000 tons annually. This is based upon the experience of many ports, even those not equipped with modern appliances. The estimate is most conservative.



PLAN FOR MONTGOMERY TERMINAL ON NEW JERSEY MAINLAND, STATEN ISLAND SOUND, PORT OF NEW YORK

H. Doc. 1124, 62-3. (To face page 36.)

Within the slips and along the quay walls of the Staten Island Sound section the plans provide for berthing facilities for 12 large-sized freighters at the same time, and further development will add 11 more, besides space for a number of barges and lighters.

Upon the north side of the Rahway River, and along the quay walls of the basin, there will be berthing facilities for 13 additional large freighters, besides room for barges and lighters. Upon the south side of the river there will be berthing frontage for 13 additional steamships.

It is to be noted that the river and basin constitute an inclosed tidal dock similar to those of foreign ports.

Instead of giving the number of square feet of the floor area of the sheds or other buildings as a capacity unit, which are generally considered as tiering the goods only 5 feet in height, it is more correct to give the available or effective cubical contents in terms of tonnage-holding capacity. Allowing 100 cubic feet per ton instead of 40 cubic feet per marine ton, and which is nearer correct for miscellaneous freight, and tiering 20 feet in height, due allowance being made for passageways, then the holding capacity of the 5 pier sheds, as shown, each one story in height, would be a total of 61,200 tons. The sheds are of such height that the miscellaneous freight can be tiered 10 feet higher, proper consideration being given to the character of the freight.

As shown, there are 27 land sheds, each 400 feet by 100 feet, and of one and one-half stories in height. Using the upper story for holding, or in some cases for storage, supplemented by the temporary holding capacity of the first half story, there would be a total holding capacity in the 27 sheds of 183,600 tons.

Six warehouses are provided each 100 feet by 300 feet, and these will have a total storage capacity of 72,000 tons. These warehouses are so arranged that they can be extended 300 feet farther toward the north, thereby doubling the storage capacity.

Railway connections.—This terminal is so located as to have direct railway connection with two lines of the Central Railroad of New Jersey, the main line of the Pennsylvania Railroad, and either directly or through other lines with the Lehigh Valley, the Baltimore & Ohio, the Philadelphia & Reading, the Erie, the West Shore, and by water with the New York Central and the New York, New Haven & Hartford.

Sheds.—The sheds about the slips will be constructed of steel frames with corrugated walls with reenforced concrete foundations. The sheds directly back of the piers on the Sound section and to the east of the basin constitute what may be called warehouse sheds. There have been planned 7 groups, each of 4 buildings, making 28 in all, to be built as needed and divided by fire walls. They will be one and one-half stories in height, of steel frame, on reenforced concrete foundation. The walls will be of reenforced concrete and the roofs of cement tile.

The warehouses proper will be of similar but heavier construction, with walls of reenforced concrete and of several stories in height.

In the beginning there will be two groups of these warehouses, each composed of three buildings. The large cotton sheds will finally be located south of the river, and will be of reenforced concrete, divided into sections by concrete partitions, each partition to hold the limited number of bales as required by the underwriters.

According to the latest methods at other terminals the roofs of these sheds will consist of movable roof panels, so constructed as to form rolling hatches, which can be moved to one side, so that the whole or part of a roof can be opened, and through these roof hatches loads can be raised or lowered by modern machinery, and by one operation transported to or from a ship's hold.

These details, as to the type of building and the handling of cotton and other commodities, have been carefully worked out for each class of freight. A distinction will be made between the type and location of warehouses for long storage; that is, for a number of months, and for what may be called "transit-freight warehouses" in distinction from the transshipment sheds. As soon as the volume of business requires it, it is planned to locate the long-storage warehouses in the industrial section.

According to the "Report on Terminals," by the Hon. Herbert Knox Smith, formerly Commissioner of Corporations of the United States, one of the essential elements of a terminal is the industrial section. This space, as shown, has been laid out for industrial lofts, and for the larger as well as for the smaller industrial establishments.

To the rear of this section, to the west, is a large area for additional trackage, other industrial establishments, and the residential section. This has been designated as the industrial area, a distinction from the industrial section.

Transferring mechanism.—In order to determine what classes of machinery should be installed, so as to secure the greatest rapidity and the least cost of transference, the different kinds of commodities to be handled should be separately considered.

For mechanical transshipment freight can be divided into two great classes; the first being bulk freight, such as ore, coal, phosphate, and sulphur, and the second miscellaneous cargoes of steamships and the package freight of cars, consisting of boxes, barrels, cases, packages of every kind, size, weight, and description, from a grand piano or a hogshead of tobacco to a crate of eggs or a case of feather-weight millinery.

In addition, there are cargoes of one commodity, but often of many marks, such as cotton, sugar, coffee, rice, and bales of many kinds of material. These would be handled by the same class of machinery as package freight. There is, moreover, a third class, consisting of exceptionally heavy or bulky units which can not well be divided, for which a few special machines are adapted.

The movement of bulk material is generally between two points only, and the chief requirement is continuous rapidity. This is attained by means of grab buckets of various types in combination with link belt conveyors or various forms of rubber belt conveyors, moving platforms, or chains.

Locomotive cranes can often be advantageously employed, but at terminals where there is a large proportion of waterfront to the terminal area, a floating crane is of the greatest utility. It can be easily moved from one place to another, and, equipped with a grab or clam-shell bucket, can unload bulk material rapidly, or with hooks instead of buckets can take the place of the stationary crane for heavy weights or bulky material.

At a terminal where electricity will be exclusively employed, such a floating crane will be furnished with electric motors, and arrangements will be made for "plugging in" at convenient intervals.

Miscellaneous freight-handling appliances and those of more universal application may be considered under three classes.

The first is the ship's winch, which, when there are several operating at one hatch, gives good economy, and would give a fair rapidity were it not for the congestion at the place of landing upon the pier. In some cases a platform is pushed out from the side of the pier at the first or second story for the reception of these miscellaneous packages.

Realizing the great disadvantage of this congestion and the limitation of the ship's winch, the engineers at all important foreign ports have installed cranes of the traveling gantry type. In some cases, as at Hamburg, over 130 of these cranes have been installed around a single dock at a total cost of over $600,000 (£123,000). It is proved by this universal custom abroad that it is not profitable for ships to use their winches on account of the detention of the ship. As the charter value of a ship may be $400 (£82) or more per day, the saving in the time of loading and discharging is of financial importance.

The ship's winch is confined in its action to about 6 feet from the edge of the pier. The gantry will serve a half circle of 35 feet radius. In each case the next movement involves the great expense for the manual labor of rehandling.

In working out the plans for the Montgomery Terminal it was determined to carry out the resolution according to the program of the International Congress of Navigation, that by mechanical appliances it should be possible to serve directly all places within the limits of the terminal. This means that by mechanical appliances it should be possible to transfer the freight between the vessel and any portion of the pier or pier shed, including tiering, or the bulkhead, the car platforms, the dray areas and platforms, the warehouse yards, marginal way, and the industrial section continuously, rapidly, and without rehandling.

To achieve these conditions of far distant hoisting and conveying it has been determined to use "transferage" or cross-space conveying, and to install movable tracks, whereby one movable track, at a far less expense, would replace many stationary cross-gridironing tracks of the older methods, serving all space by the machinery, which no stationary tracks could do.

To secure these results most satisfactorily the best type of connection between the fixed and movable cross tracks was selected. One of these types of switches is called a glider, or gliding switch, and another the opening glider, which latter permits the transferring machinery to pass by the switch, continuing in a straight line, or to take a movable cross-over or the movable loop track. This latter type is controlled by the transferman from his cab.

All parts of the terminal, including the industrial section, are connected by the above overhead runways, and also by surface railroad tracks for full carloads. The industrial sections are also connected with the berthing locations of the water front, all railway platforms, and the team track section.

According to this arrangement freight when delivered upon the piers, bulkheads, marginal way, if a carload lot, is conveyed by surface railway to its destination about the terminal. A small water-borne consignment, or portion of a mixed carload, is transported directly to its place by overhead runways, whether to the shed, warehouse, or factory. This ease and flexibility of shipping and receiving goods make the industrial sections remote from the water front equally valuable with those adjoining the marginal way.

The number of tractors and transfer trailer hoists will depend upon the tonnage to be transferred, and any or all of the tractors and transfers can be concentrated at any portion of the terminal for quick transferring. At some locations the transferage system will be supplemented by the walking gantry crane, and at others by the ship's winch. Hinged loops, or movable projection loops, will be arranged to extend over the ship's hatches and decks and also to serve barges and lighters.

The great points of advantage which such a terminal possesses are its great land area, its railroad connections, its location, and the superiority of its transferring machinery, so as to secure the lower transshipment costs and less ship detention, due to the rapidity of loading and discharging by such appliances.

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62D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1125.

PORT ARANSAS, TEX.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF PORT ARANSAS (ARANSAS PASS AND THE HARBOR ISLAND BASIN), TEX.

DECEMBER 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, December 11, 1912.

SIR: I have the honor to transmit herewith a report, dated December 4, 1912, with map, on examination of Port Aransas (Aransas Pass and the Harbor Island Basin), Tex., by a special board of engineers, constituted in pursuance of an item contained in section 1 of the river and harbor act approved July 25, 1912. There is also transmitted a letter from the Chief of Engineers, dated December 11, 1912, in which he concurs in general with the views of the special board and of the Board of Engineers for Rivers and Harbors, and reports specifically his conclusions in regard to the improvement in question.

Very respectfully,

H. L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 11, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Examination of Port Aransas, Tex.

1. There is submitted herewith, for transmission to Congress, report dated December 4, 1912, with map, by a special board of engineers,

constituted pursuant to the following item contained in section 1 of the river and harbor act approved July 25, 1912:

> The Secretary of War may appoint a board of three engineer officers, whose duty it shall be to examine Port Aransas (Aransas Pass and the Harbor Island basin), Texas, and make an estimate of the cost of securing a depth of twenty-five feet, or such depth as may be considered advisable in the interest of commerce. And said board shall report fully upon all matters pertaining to the creation of a deep-water harbor of the first class, including the dike on Saint Joseph Island and harbor facilities at the northern end of Mustang Island. And the said board shall also report whether the waters lying between Harbor Island and the mainland may be exempted from the operation of the laws relating to navigable waterways of the United States.

2. Aransas Pass has been improved by the construction of two jetties, and the act of February 27, 1911, adopted a project for the establishment of a deep-water harbor embracing a roadstead 20 feet deep, 1,200 feet wide, and 3,000 feet long in front of Harbor Island, and a channel of similar depth 400 feet wide, and 5,420 feet long, leading from the northern end of the roadstead, including also the construction of a dike on St. Joseph Island. As a result of its study and investigation, the special board believes that the heretofore authorized depth of 20 feet will not adequately meet the requirements of commerce at this place, and that it is now advisable to increase the depth to 25 feet. It is also proposed to extend the dike on St. Joseph Island to prevent a possible cutting across the island and formation of another channel, and to dredge a 12-foot channel leading from the roadstead to the north end of Mustang Island, in order to relieve congestion at landings on the Pass. The estimates of cost of the work recommended amount to $2,325,000.

3. The act requires report as to whether the waters lying between Harbor Island and the mainland may be exempted from the operation of the laws relating to navigable waterways of the United States. Having due regard to both sanitation and navigation, the special board recommends:

> That so much of the shallow waters between the mainland on one side and Harbor Island and the chain of islands northward thereof on the other side, and northeasterly of the Aransas Pass Channel & Dock Co.'s artificial channel through Harbor Island to the town of Aransas Pass, be exempted from the operations of the laws relating to navigable waterways of the United States, but that said exemption be not at this time made with regard to said artificial channel of the Aransas Pass Channel & Dock Co. or to the shallow waters southerly and westerly thereof.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 9, 1912, concurring in the views and recommendations of the special board.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the special board and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Port Aransas, Tex. (Aransas Pass and Harbor), is deemed advisable so far as to secure an available harbor and channel depth of 25 feet with widths as specified in the report, including extension of dike on St. Joseph Island and extension of jetties as proposed and excavation of a 12-foot channel from the roadstead to the north end of Mustang Island, following in general the methods described in the report of the special board, at an estimated cost of $2,325,000 for first construction and $25,000 annually for maintenance, these estimates being based on the supposition that the con-

struction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $500,000 and subsequent appropriation of about $900,000 per year for two years.

W. H. Bixby,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

The Board of Engineers for Rivers and Harbors,
December 9, 1912.

To the Chief of Engineers, United States Army:

1. The Board of Engineers for Rivers and Harbors has had under consideration the within report of a special board on examination of Port Aransas, Tex., ordered in section 1 of the river and harbor act approved July 25, 1912, as follows:

> The Secretary of War may appoint a board of three engineer officers, whose duty it shall be to examine Port Aransas (Aransas Pass and the Harbor Island basin), Texas, and make an estimate of the cost of securing a depth of twenty-five feet, or such depth as may be considered advisable in the interest of commerce. And said board shall report fully upon all matters pertaining to the creation of a deep-water harbor of the first class, including the dike on Saint Joseph Island and harbor facilities at the northern end of Mustang Island. And the said board shall also report whether the waters lying between Harbor Island and the mainland may be exempted from the operation of the laws relating to navigable waterways of the United States.

2. By the act of February 27, 1911, a project was adopted for the establishment of a deep-water harbor at this locality having a roadstead 20 feet deep, 1,200 feet wide, and 3,000 feet long in front of Harbor Island, and a channel of similar depth 400 feet wide and 5,420 feet long leading from the northern end of the roadstead. The project includes also the construction of a dike on St. Joseph Island. The special board states that the insufficiency of the proposed depth of 20 feet for future commerce was recognized at the time it was recommended. It appears that vessels are now calling at the port, and while the commerce is not great a study of economic and transportation conditions throughout the tributary area of Texas leads the special board to believe that the inherent advantages of this locality can not fail to be recognized in the near future, especially in view of the increasing congestion of other existing routes of exportation. The work recommended by the special board and the estimated cost of the same are as follows:

Repairs to south jetty	$10,000
Repairs to north jetty	39,000
Extension of south jetty 2,250 feet	682,500
Extension of north jetty 1,950 feet	946,000
Extension of St. Joseph Island dike 9,100 feet	240,000
Dredging to 25 feet between jetties	164,500
Dredging to 25 feet in Harbor Island basin	234,000
Dredging to 12 feet in approach to Port Aransas from Turtle Cove and Harbor Island basin	9,000
Total	2,325,000

The estimate for maintenance is given at $25,000. The extension of the St. Joseph Island dike is regarded as necessary to prevent the possible cutting across the island and formation of another channel from Aransas Bay to the Gulf, while the 12-foot channel communicating with the northern end of Mustang Island is deemed desirable to obviate the necessity of light-draft boats landing directly on the pass. The special board states that the right of way should be given for the dike on St. Joseph Island and that the construction of the 12-foot channel and basin should be contingent upon the construction of the necessary bulkheads by local interests.

3. With reference to that part of the item of law relating to the waters north of Harbor Island the special board recommends:

> That so much of the shallow waters between the mainland on one side and Harbor Island and the chain of islands northward thereof on the other side and northeasterly of the Aransas Pass Channel & Dock Co.'s artificial channel through Harbor Island to the town of Aransas Pass be exempted from the operations of the laws relating to navigable waterways of the United States, but that said exemption be not at this time made with regard to said artificial channel of the Aransas Pass Channel & Dock Co. or to the shallow waters southerly and westerly thereof.

4. After careful consideration of the information presented, the Board of Engineers for Rivers and Harbors concurs in the recommendations of the special board, believing that the work outlined is required to fully qualify this port for the important commercial uses for which it was created. The board therefore expresses the opinion that it is advisable for the United States to undertake the further improvement of Aransas Pass and harbor to the extent above indicated, at a total estimated cost of $2,325,000. The work should be authorized under continuing contract and the initial appropriation should be $500,000, with subsequent appropriations in such sums as will allow the work to be finished in three years.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

EXAMINATION OF PORT ARANSAS (ARANSAS PASS AND HARBOR ISLAND BASIN), TEX.

United States Engineer Office,
Galveston, Tex., December 4, 1912.

Sir: The board of officers appointed by paragraph 2, Special Orders, No. 20, Office of the Chief of Engineers, Washington, August 15, 1912, to make an examination and report thereon of Port Aransas (Aransas Pass and the Harbor Island Basin), Tex., has the honor to submit the following report:

The board was convened pursuant to the clause in the river and harbor act of July 25, 1912, which states:

> The Secretary of War may appoint a board of three engineer officers, whose duty it shall be to examine Port Aransas (Aransas Pass and the Harbor Island basin), Texas, and make an estimate of the cost of securing a depth of twenty-five feet, or such depth as may be considered advisable in the interest of commerce. And said board shall report fully upon all matters pertaining to the creation of a deep-water harbor of the

first class, including the dike on Saint Joseph Island and harbor facilities at the northern end of Mustang Island. And the said board shall also report whether the waters lying between Harbor Island and the mainland may be exempted from the operation of the laws relating to navigable waterways of the United States.

The board met at Galveston, Tex., November 28, and then proceeded to Corpus Christi, Tex., reaching that point November 29. It examined the waterways tributary to Port Aransas, and held a public hearing at San Antonio, Tex., on November 30. A copy of the testimony[1] at this hearing is appended hereto, together with a number of letters[1] submitted to the board covering certain features of the matters under its consideration.

A depth of 20 feet across the bar and through the pass to the roadstead and over the turning basin of this harbor, and along the front of Harbor Island for a distance of about 8,600 feet now exists as a result of the appropriation made by Congress following the recommendation made by a board of engineers which considered this subject in 1910. The report of that board was published as House Document No. 1094, Sixty-first Congress, third session.

The conditions prevailing at the locality were described by the board of 1910 in its report, and the following extracts are taken therefrom:

> Almost the entire Texas coast throughout its extent of over 330 miles is fronted by a fringe of low-lying sand islands or peninsulas, lying from 2 to 12 miles from the mainland.
>
> Aransas Pass is located at what might be termed the apex of the curve of the Texas coast. It is 180 miles southwest of Galveston and 128 miles north of the mouth of the Rio Grande. It connects Corpus Christi and Aransas Bays and the adjacent waters with the Gulf. St. Joseph Island is upon the north, Mustang Island to the south, and opposite the inner end is Harbor Island, which separates Aransas Bay from Corpus Christi Bay. The pass was 50 years ago nearly a mile farther north than at present, the lighthouse on Harbor Island having been originally constructed opposite the inner end. It continued to move toward the south until in 1888 a stone revetment was placed across the head of Mustang Island, which stopped further movement, and since that date it has remained practically stationary. The term "Aransas Pass" is sometimes applied to the portion between St. Joseph and Mustang Islands, and sometimes taken to include the deeper water to the northward between Harbor and St. Joseph Islands.
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> There are numerous other bodies of water connected with Corpus Christi and Aransas Bays, such as Laguna de Madre, Neuces, Mesquite, St. Charles, and Copano Bays, and others. These latter are, however, all so shallow that they are unavailable for commercial purposes, and are used only by smaller boats and fishing craft.
>
> Aransas Pass, with its two principal tributary bays of Corpus Christi and Aransas, forms the most available locality for the entrance of vessels west of Galveston and has always been more or less utilized.
>
> The depth over the bar at the Gulf end in its natural condition has varied at different times from 7 to 9 feet.
>
> The importance of the locality to commerce was early recognized, and it has been utilized as far as the depth would permit.
>
> Various attempts have been made to improve the depth over the bar. The United States in 1884–85 endeavored to secure a deeper channel by means of a single jetty upon the south side, built of brush and stone. Appropriations were not made in such manner as to permit the work to be carried on rapidly or satisfactorily or to build more than one jetty, and nothing of importance was accomplished. Work at the locality was later turned over to private parties, one of whom made attempts to secure greater channel depths across the bar by means of a single jetty of timber gabions upon the south side; another tried by means of a single jetty of rock upon the north side, but both these plans were unsuccessful.
>
> The water between Corpus Christi Bay and Aransas Bay to the west of Harbor Island is exceedingly shallow—so shallow, in fact, that the Coast and Geodetic Survey did not attempt upon its maps to give depths for a large portion of the area. A narrow,

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[1] Not printed.

irregular channel ran through this shallow stretch, but was in places badly obstructed by shoals. It was deepened by private parties about 1874, and has since been known as the Morris and Cummings cut.

The board of 1910 recommended a roadstead 20 feet deep, 1,200 feet wide, and 3,000 feet long in front of Harbor Island, and a channel of similar depth 400 feet wide and 5,420 feet long in a northerly direction from the northern end of this roadstead from which slips could easily be excavated by State or private agencies into Harbor Island.

The act of February 27, 1911, in making appropriation for this harbor, stated as follows:

> For the construction of a deep-water harbor or port within the entrance to Aransas Pass, at Harbor Island, Texas, in accordance with the report submitted in House Document Numbered One thousand and ninety-four, Sixty-first Congress, third session, one hundred and twenty-five thousand dollars: *Provided*, That the Secretary of War may enter into a contract or contracts for such materials and work as may be necessary to complete the said project, to be paid for as appropriations may from time to time be made by law, not to exceed in the aggregate two hundred and fifty thousand dollars exclusive of the amounts herein and heretofore appropriated: *Provided further*, That no part of the amount herein appropriated or authorized to be appropriated shall be expended until the Secretary of War shall be satisfied that the interests of the general public are duly protected in the use of said harbor and that no terminal monopoly will be possible: *And provided further*, That the title or easements in any land needed in connection with the construction of the dike proposed as a part of this improvement shall be vested in the United States free of cost.

This proviso against terminal monopoly led to the enactment by the State of Texas of a law approved March 13, 1911, copy of which is appended hereto.[1] This law was accepted by the Secretary of War as sufficient to meet the requirement of Congress, and it is therefore unlikely that any terminal monopoly can be created at this locality.

Owing to a change in conditions between the date, the estimates for doing the work were prepared and the time of actual dredging undertaken; the funds proved insufficient to complete the 400-foot channel throughout the entire projected length of 5,420 feet. The roadstead was completed and 3,000 feet of channel 150 feet wide secured, leaving 2,400 feet yet to be obtained under subsequent appropriation. The board of 1910 recognized the fact that a depth of 20 feet would probably be inadequate as the port was developed and commerce began to flow through it, for its report contains the following statement:

> The board calls attention to the fact that one of the advantages of Harbor Island as the location for this harbor compared with the localities on the mainland is the comparatively small cost at which a depth of 25 feet can be obtained should Congress consider it advisable to deepen the entrance channel to this extent, and the board believes that whenever shipping interests utilizing the harbor require a greater depth than 20 feet such greater depth should be provided both in the channel between the jetties and throughout the harbor.

As soon as the establishment of the harbor was assured, interested parties formed the Aransas Pass Terminal Co. and commenced the construction of a railroad from the mainland to the harbor, with a suitable wharf and storage sheds. In September last the first ship arrived at this terminal and departed with a cargo of about 9,800 bales of cotton on a draft of 19.5 feet. Since then other ships with draft slightly less than 20 feet have used this port. The commerce has not as yet attained the magnitude expected for it. This is due partly to the newness of the harbor and terminal facilities which were completed too late for this season's traffic to accommodate itself to the new route and partly to opposition on the part of railroad corporations, and other interests favoring older lines of freight movement and opposed to the change that would be necessary in existing routes of transportation.

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[1] Not printed.

The situation is explained in a letter from Mr. Y. Van Den Berg of December 1, 1912, appended hereto.[1] Such opposition results naturally from the fact that any railroad which has a line direct from producer or consumer to an already established port will oppose the deflection of its freight to another port which must be reached via another railroad with consequent division of transportation charges. In time, however, the physical advantages of the new port by reason of lessened mileage of transportation to its large tributary territory can not fail to overcome such opposition, and parties interested have already initiated steps toward that end.

Meanwhile there has arisen a real demand for additional depth at Aransas Pass. There can be no doubt that the depth of 20 feet is too small for a harbor to handle the commerce which there is every reason to believe will pass through this port. The present depth will admit but a small percentage of existing commercial ocean carriers probably about 25 per cent. With the smaller vessels, and with such a commodity as cotton, the existing depth of 20 feet will permit quite an extensive business, but with the heavier freights, such as cottonseed products, grain, etc., a greater depth is unquestionably necessary to permit larger ships to be used and more economical ocean rates to be obtained. It is believed that the commerce of the next few years can be accommodated with a depth of 25 feet, though a still greater depth will unquestionably be necessary if the great majority of ocean carriers are to be accommodated.

In the present state of the ocean-carrying trade the depth of 20 feet will not permit a full commercial development at Port Aransas. A depth of 25 feet, however, will permit a great increase in tonnage and a subsequent increase of the depth to 30 feet will enable the port to handle practically all the business that is likely for many years to seek this gateway.

A depth of 25 feet can be obtained at a much earlier date than a depth of 30 feet with a corresponding relief to the commerce of southern Texas, and as the expense to the United States of securing the less depth first and giving the greater depth later when needed will be no greater than for making the 30-foot depth at first it is believed that the gradual development of the harbor presents both the more rational and the more advantageous method.

With regard to the effects of deeper water at this port, the board invites attention to the statements made at the hearing held at San Antonio, appended hereto, and also to the various letters[1] from San Antonio business houses indicating the saving not only in freight rates but also in time of delivery if they can bring their goods through Aransas Pass instead of by way of Galveston. It developed at the hearing, and the board established the fact in its subsequent visit to Galveston, that the commerce of that port has grown to such an extent within the last few years that there is difficulty in avoiding a congestion there. The establishment of a deeper water port at

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[1] Not printed.

Aransas Pass would not only avoid the delay incidental to congestion at Galveston, but give the farmers and business men of southern Texas a reduction in freight rates which would materially assist in the further development of this section.

That portion of the State south of the main line of the Southern Pacific Railroad, hitherto but little developed, has been growing rapidly within the last two years, and the territory behind and tributary to the port of Aransas Pass promises to furnish sufficient commerce to justify the establishment of a good harbor at that locality. Some of the letters attached show the rate of increase in rail shipments and taxable property which has occurred recently. The San Antonio & Aransas Pass Railroad, traversing this section, has found it necessary to increase very materially the number of its passenger trains, and the freight traffic has also greatly increased.

The increase in freight traffic upon this railroad during the 12 months ending September 30 has been approximately 22 per cent. There is good reason to believe that an appreciable portion of this commerce would reach eastern ports through Aransas Pass were the means provided. The assessed value of the property in the counties south of the Southern Pacific Railroad and west of Aransas Pass has increased from $193,000,000 in 1909 to $241,000,000 in 1911, or about 25 per cent in these two years.

Aransas Pass affords the best location for a harbor on the Texas coast to the south or west of Galveston. Its distance, 180 miles, from that port is greater than that between Boston, Mass., and Portland, Me., or between Charleston and Savannah and about the same as that from Baltimore to Norfolk. Owing to the configuration of the coast, Aransas Pass will serve the country behind it much more cheaply and readily than could Galveston, and that portion of the State which which would enjoy reduced freight rates by the establishment of a harbor of the first class at this point is so considerable that this board believes steps should be taken to keep the harbor in condition adequate to handle the commerce through it as it develops.

The establishment of a harbor of greater depth involves the extension of the jetties to a distance seaward corresponding to the depth desired and more or less dredging in both the channel of approach and the harbor proper. The board has been furnished by the district officer with estimates of cost for doing this work, and they are given below.

After careful study of the situation and with full consideration of all facts and arguments presented to it, the board recommends such extension of the jetties as will suffice eventually for a depth of 30 feet, with such repair of both structures as is now necessary. An extension of 1,950 feet for the north jetty and of 2,250 feet for the south jetty is deemed at this time sufficient for this purpose.

In studying the problem and making the estimates for the work involved in securing the different depths the fact is developed that under conditions prevailing at this time the difference in lengths of the jetties necessary for a 30-foot channel is only a few hundred (about 250) feet over that required for a 25-foot channel. It will therefore be much more economical for the United States to build the jetties to their full length at one time and under one contract than to build them merely for a 25-foot entrance, and subsequently have to make such an addition, for which, on account of the character of the plant needed and the small amount of work involved, the cost would be relatively high.

The board further recommends the dredging of the channel between the jetties to a depth of 25 feet and width of 600 feet, and the dredging of the Harbor Island Basin to the same depth over the areas recommended by the board of 1910, namely, a roadstead 3,000 feet long and 1,200 feet wide and a channel 400 feet wide and 5,420 feet long along the front of Harbor Island.

It is also recommended that the small triangular area lying between the present roadstead, the channel to Corpus Christi, and the established harbor line along the Harbor Island front be included in the roadstead and be dredged to full depth whenever the roadstead is deepened. This triangle forms an obstructive point projecting into the harbor and should be dredged away to facilitate the movement of vessels. Its removal will also extend the harbor front available for wharves and terminals about 600 feet at relatively small cost.

While 25 feet is the depth at present recommended, the estimate includes all jetty and other rock work that will be necessary for a depth of 30 feet. The subsequent obtaining of this greater depth will then be a matter of dredging alone, which work can easily be performed when the commerce has been developed sufficiently to make this greater depth imperative. As matters stand, the depth of 25 feet throughout ought to be obtained simultaneously with the extension of the jetties and dike herein proposed and should be completed within two years from the time appropriation therefor has been made.

The rock work should be under one contract, by continuing-contract system or by the appropriation of its full estimated cost at one time. If by the former method, the initial appropriation should be not less than $500,000. The dredging between the jetties can probably best be done with Government plant now on hand, and the dredging in Harbor Island Basin and in the approach to Port Aransas should be done by contract.

The board feels that the natural forces at Aransas Pass will maintain between the jetties a depth somewhat over 20 feet, but that a depth in the entrance of 25 feet will have to be created and maintained by dredging, at an estimated annual cost for maintenance of $25,000. A further depth of 30 feet between the jetties would cost not only more to create but more to maintain. A discontinuance of dredging for maintenance would result in a shoaling of the entrance channel to approximately its present depth.

The board of 1910 made the following statement concerning a dike upon St. Joseph Island:

> The southern end of St. Joseph Island, from the lower point of which the north jetty starts, is low and sandy with an average height of about 3 feet above mean low tide. Immediately adjacent to the north jetty is a low place which at the high tides occurring in the fall of the year is covered by water. Under present conditions there is a strong probability and great danger that a channel may be cut by storms across the lower portion of this island. Such an event would endanger the depth of water between the jetties and jeopardize the channel upon which the Government has expended so much money. To prevent such a catastrophe the board believes that some form of dike should be built along the middle of this island as far as necessary to protect the present Government work. The most efficient method of building such a dike would be by forming a mound of rubble stone, about 8 feet high above mean low water, with a width on top of about 10 feet. The cost of such a mound would be $20 per linear foot. The distance from the north jetty to the high sand

hills farther up the island is about 20,000 feet, but as the danger is greatest at the south end of the island the board is of the opinion that this dike need not at first be built of greater length than about 10,000 feet. This would protect the roadstead and channel from drifting sand and secure the island from danger of erosion. The cost of this dike, 10,000 feet in length, would be $200,000.

The work has been done and has served well the purpose for which the dike was built.

This board after an examination of the locality, believes that the existing dike should be extended about 9,100 feet from its northern end to the high sand dunes. The extension should follow a line approximately along the middle of the island, but its exact location could best be determined by the officer in charge of the construction at the time of beginning work. The low places among the sand dunes beyond the end of the dike could most economically be closed by a suitable system of sand fences. The right of way for dike and fences should be furnished to the United States without cost.

The act of Congress requires this board to consider and report upon the question of harbor facilities at the northern end of Mustang Island. From inquiry of the mayor of the town of Port Aransas and others at whose request this clause was inserted, it was learned that the object desired is not the establishment of a harbor for ocean-going craft, but a place, or subharbor, that would shelter small craft and also afford better access to Mustang Island. The number of fishing craft and small commercially employed gasoline boats plying these waters is considerable, and owing to the conditions at the harbor there is no place for them to lie or seek shelter except in the deep water of the harbor or in water so shoal that there is constant danger of grounding. At present the town of Port Aransas can not be approached by water except at a wharf facing on the entrance channel of the pass, where in stormy weather the landing of light-draft boats is difficult, and where there is at all times a congestion of vessels inconvenient to passenger traffic and obstructive to the handling of freight. The town of Port Aransas is likely to become the principal place of residence of those employed at the Harbor Island terminals, and reasonably free access and ferriage facilities should be afforded.

To secure these results the board recommends that a channel 12 feet deep and 1,200 feet long to a turning basin 200 feet square at the inner end be dredged in a southerly direction from the roadstead and through the shallow bay at the north end of the island approximately in the position shown upon the map accompanying this report. It is believed, however, that the final determination of location can best be made by the district officer at the time of construction after consultation with the authorities and business interests of the town. The construction of this channel should be contingent upon the construction without cost to the United States of a bulkhead satisfactory to the Chief of Engineers behind which the dredged material can be deposited.

The board, as directed, has also considered the question of exempting from the operation of the laws relating to navigable waterways of the United States the waters between Harbor Island and the mainland.

The waters concerned are the shallow areas behind Harbor Island traversed by the Morris and Cummings Cut mentioned before. Outside of the cut the depth is generally not more than 4 or 5 feet, while adjoining the shore the depth is not greater than 1 or 2 feet for the distance of a mile or more.

The channel or cut is now available for light-draft vessels drawing not over 5 feet, and affords a somewhat shorter line between Aransas and Corpus Christi Bays than the channel in front of Harbor Island via Port Aransas Harbor and Turtle Cove Channel. It saves 2½ miles in distance, but is somewhat tortuous and for through traffic of such light-draft vessels as will use the Intracoastal Canal is not desirable, as it will require considerable dredging and numerous beacons or other channel marks. No good reason for double tracking this portion of the Intracoastal Canal is apparent.

This Morris and Cummings Cut, in connection with the canal of the Aransas Pass Channel & Dock Co., to the town of Aransas Pass, affords a light draft navigable connection between that place and the coast canal system. The abandonment of this canal would render the town inaccessible from adjacent inland waters except by a long detour. The people of the town fear that the construction of embankments or causeways from the island to the mainland would result in creating large tracts of stagnant water, a thing to be avoided in the climate of this locality, and ask that means of circulation be provided whatever action is taken.

The building and maintenance of drawbridges on the lines of railroads between the mainland and Harbor Island would be more or less an obstacle to the free passage of trains from the mainland to the harbor terminals.

After due consideration of all the various interests affected it is recommended by the board that so much of the shallow waters between the mainland on one side and Harbor Island and the chain of islands northward thereof on the other side, and northeasterly of the Aransas Pass Channel & Dock Co.'s artificial channel through Harbor Island to the town of Aransas Pass, be exempted from the operations of the laws relating to navigable waterways of the United States, but that said exemption be not at this time made with regard to said artificial channel of the Aransas Pass Channel & Dock Co., or to the shallow waters southerly and westerly thereof.

The cost of the several items of work recommended by the board is as follows:

Repairs to south jetty, 2,500 tons, at $4	$10,000
Repairs to north jetty, 9,750 tons, at $4	39,000
Extension of south jetty, 2,250 feet, 175,000 tons rock, at $3.90	682,500
Extension of north jetty, 1,950 feet, 215,000 tons rock, at $4.40	946,000
Extension of St. Joseph Island Dike, 9,100 feet, 60,000 tons rock, at $4	240,000
Dredging to 25 feet between jetties, 1,175,000 cubic yards, at 14 cents	164,500
Dredging to 25 feet in Harbor Island Basin, 1,950,000 cubic yards, at 12 cents	234,000
Dredging to 12 feet in approach to Port Aransas from Turtle Cove and Harbor Island Basin, 75,000 cubic yards, at 12 cents	9,000
Total	2,325,000

The above amounts include the cost of engineering, superintendence, and contingencies.

To summarize, the board recommends that the harbor be provided at as early a date as practicable with a depth of 25 feet and to secure this that the following work be done, the details being given above in this report: Extension of the south jetty, 2,250 feet under contract; extension of the north jetty 1,950 feet under contract; dredging to 25

feet of the channel of approach by Government plant; dred
feet of the roadstead and 400-foot channel northward
under contract; extension of dike on St. Joseph Island; d
12 feet of channel or harbor for small craft at north end o
Island.

The estimated cost of this work is $2,325,000.

The board recommends that the work be authorized
continuing-contract system, that the initial appropriation b
than $500,000, and that subsequent appropriations be s
allow the work to be finished in two or three years.

Concerning the waters between Harbor Island and the
the board recommends as stated above.

There is no question of water power involved nor any q
terminal facilities beyond what has already been adequat
mined by Federal and State enactments.

Edw. Bur
Colonel, Corps of Eng
Lansing H. Beac
Lieut. Col., Corps of Eng
C. S. Rich
Lieut. Col., Corps of Engi

The Chief of Engineers, United Stated Army.

[For Report of the Board of Engineers for Rivers and H
see page 3.]

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1126.

PAGAN RIVER, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF PAGAN RIVER, WITH A VIEW TO SECURING A DEPTH OF 12 FEET, AND A TURNING BASIN AT SMITHFIELD, VA.

DECEMBER 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 7, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated October 21, 1912, together with copy of a report from Lieut. Col. M. M. Patrick, Corps of Engineers, dated October 31, 1910, on preliminary examination of Pagan River, Va., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 21, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Pagan River, Va.

1. There is submitted herewith, for transmission to Congress, report dated October 31, 1910, by Lieut. Col. M. M. Patrick, Corps of Engineers, on preliminary examination of Pagan River, Va., with a view to securing a depth of 12 feet, and a turning basin at Smithfield, authorized by the river and harbor act approved June 25, 1910.

2. The United States has already provided in Pagan River a channel 40 feet wide and 10 feet deep at mean low water up to Smithfield, a distance of about 9 miles, with some widening at bends and at Smithfield sufficient for a turning basin. The present investigation therefore is with reference to an increase in depth to 12 feet.

3. The district officer is of opinion, concurred in by the division engineer, that the existing depth is sufficient to accommodate the vessels now using this waterway and to meet the demands of navigation and commerce for a long time to come.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated November 25, 1910, concurring in the opinion expressed by the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Pagan River, Va., with a view to securing a depth of 12 feet, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 25, 1910.

Respectfully returned to Chief of Engineers, United States Army.

The act of March 2, 1907, provided for a preliminary examination of Pagan River with a view to straightening and deepening the channel. As a result of that examination and the survey which followed, a project was recommended which contemplated the straightening of the channel by increasing the width at certain sharp bends or angles, at an estimated cost of $4,600 and about $1,000 annually for maintenance after completion. Reports on this subject which contain complete descriptions of physical and commercial conditions may be found published in House Document No. 397, Sixtieth Congress, first session, to which attention is invited. The available depth at that time was 10 feet, which was regarded as sufficient.

The act of June 25, 1910, adopted this project and appropriated the full amount estimated for original work. It is expected that this improvement will be undertaken at an early date. The present investigation has in view an increase in depth to 12 feet. From the information now available it appears that the depth of 10 feet is sufficient to accommodate the vessels using this waterway and to meet the demands of navigation and commerce.

In view of the foregoing the board concurs in the opinion of the district officer and the division engineer that it is not advisable, at this time, to undertake the further improvement of Pagan River with a view to securing a depth of 12 feet and a turning basin at Smithfield. Interested parties were notified of the adverse report of the district officer and invited to submit their views to the board, but no communications on this subject have been received.

The district officer refers to docks and terminal facilities, and in compliance with the act of June 25, 1910, the board further reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF PAGAN RIVER, VA.

ENGINEER OFFICE, UNITED STATES ARMY,
Norfolk, Va., October 31, 1910.

SIR: In compliance with the instructions contained in department letter dated August 4, 1910, I have the honor to submit the following report upon a preliminary examination of Pagan River, Virginia, with a view to securing a depth of 12 feet, and a turning basin at Smithfield, as directed by Congress in the river and harbor act approved June 25, 1910.

The following description of Pagan River and the country tributary thereto is extracted from a report upon a previous preliminary examination submitted by this office under date of August 1, 1907, and published in House Document No. 397, Sixtieth Congress, first session:

> Pagan River is a tributary of the James River, entering from the right bank about 7 miles above Hampton Roads. The head of navigation is at Smithfield, about 8 miles from the channel in the James River.
>
> Pagan River is a tidal stream with a normal tidal range of 2.6 feet. The river varies in width from 4,500 feet at the mouth to a little over 100 feet at Smithfield wharves. The navigable channel is narrow at all points, being bordered by extensive tidal flats in the wider parts of the stream. The river banks alternate from side to side between high and well-defined clay banks and marshy areas.
>
> In the first 2 miles of the river below Smithfield are three sharp bends, approximately 90 degrees. These sharp bends, with the existing narrow channel, constitute the chief difficulties in navigation, and concerning which the navigation interest complain.
>
> Two steamers of the Old Dominion Line make regular daily trips between Smithfield and Norfolk. Besides these steamers there is a considerable fleet of small boats, sail and power, which carry the products of the territory adjacent to the river to the market at Norfolk.
>
> Smithfield is the only town on the river. It is a prosperous community, with waterworks, sewers, and gas plant. It has two banks, which are reported to do a business of several millions yearly.
>
> The territory traversed by the river is a productive trucking region, while the tidal flats in the river itself are utilized for oyster culture. The nearest railroad station to Smithfield is 15 miles distant, and this town and the farms along the river banks, representing a population of about 5,000, are wholly dependent upon water transportation for marketing their products and for receiving their supplies. The commerce of the river is considerable both in tonnage and value. The principal items are peanuts, oysters, farm truck, hog products, lumber, and brick. Smithfield hams and bacon have an extensive reputation, and the shipment of hog products constitutes no small element in the commerce.

The commerce, as reported for the last five years, is as follows, practically all of it being carried between points on the river and Norfolk, Va.:

	Tons.
1905	82,207
1906	87,505
1907	89,289
1908	84,108
1909	84,424

The average value of this annual commerce is about $6,000,000. In addition, the steamers plying on this stream carry an average of about 50,000 passengers annually.

The act of Congress approved June 6, 1900, directed an examination of Pagan River from Smithfield, Va., to James River, with a view to securing a channel 80 feet wide and 10 feet deep at mean low tide, or such improvement as may be found expedient. Reports on the examination and survey made in compliance with the act referred to were made by Col. James B. Quinn, Corps of Engineers, and may be found on page 1475 et seq. of the Annual Report of the Chief of Engineers for 1901. Col. Quinn submitted an estimate of $36,088 for securing a channel 10 feet deep and 80 feet wide, and an estimate of $28,870 for a channel 8 feet deep and 80 feet wide.

Prior to the examination and survey mentioned, Congress had appropriated, in 1880 and 1881, an aggregate of $10,000, with which the bar at the mouth and several inside bars were dredged to a depth of 8 feet.

The act of June 13, 1902, appropriated $10,870 for improving Pagan River in accordance with Col. Quinn's report. The appropriation made by the act of June 13, 1902, was not applied to any work until 1905, Congress having in the meantime, in the act of March 3, 1905, provided that:

> The Secretary of War may, in his discretion, expend the balance remaining to the credit of said improvement, with a view to securing a channel width of not less than 40 feet and such depth as may be obtained without exceeding said balance.

Under the authority thus granted, a 10-foot channel, 40 feet wide, was dredged in 1905 and 1906 through the bar at the mouth of the river and through several shoals in the first 4 miles below Smithfield.

The act of Congress approved March 2, 1907, directed an examination of this stream with a view to straightening and deepening the channel. Reports upon the preliminary examination and plans and estimates of cost by Maj. Joseph E. Kuhn, Corps of Engineers, may be found in the Congressional document first mentioned above.

Congress in the river and harbor act approved June 25, 1910, adopted the project submitted in the report last mentioned and appropriated the sum of $4,500 for its execution. This work has already been advertised, and it is expected that a contract therefor will be let at an early date.

With this available sum a turning basin will be excavated at Smithfield, and the channel will be straightened at the angles, all to a depth of 10 feet at mean low water. The two steamers plying regularly on this stream draw about 8 feet when fully loaded; a considerable quantity of raw material is now being taken out of this stream to a new cement-making plant at Norfolk, Va., but the loaded barges upon which it is carried and the towing tug draw but about 8 feet; coal is carried to Smithfield on barges of about the same draft.

There seems to be no probability that steamers of greater draft than those now in use will be needed on this stream for a long time to come; if greater depth were available, it is possible that advantage might be taken of it to ship in coal, fertilizer, and the like on sailing vessels of suitable size, but there is nothing to indicate that the amount of such commerce would be so great as to warrant any attempt to make provision for it. All the traffic on this stream is handicapped much more by the narrowness of the channel—only 40 feet wide, in which two boats of any size can hardly pass—than by any deficiency in channel depth.

The work to be done with the money now available will ameliorate this condition to a certain extent, by reason of the widening to be done at the bends, but there will still be long reaches where the lack of sufficient width will render navigation difficult and hazardous.

For Smithfield and the neighboring country, distant as they are from a railroad, and dependent entirely on water transportation, all which is necessary should be done to make easy and safe the traffic on the Pagan River; an increase in the width of the channel would do much more in this direction than any increase in channel depth only. As stated above, the available funds will provide for excavating a turning basin at Smithfield with a depth of 10 feet.

In view of all the facts, I am of the opinion that this stream is not worthy at present of further improvement with a view to securing a depth of 12 feet.

The Pagan River is a tidal stream, and no question of water-power development enter into any plans for its improvement.

Although at none of the shipping points on this stream are there any docks owned by the public, the existing terminal facilities are considered ample for the present and prospective commerce.

Respectfully submitted.

Mason M. Patrick,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, United States Army
(Through the Division Engineer).

[First indorsement.]

Office of Division Engineer, Southeast Division,
Savannah, Ga., November 4, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army.

I agree with the district officer that a 10-foot depth to Smithfield is sufficient for the present and prospective commerce on Pagan River, and that any further improvement that is contemplated should be in the line of giving greater width and not greater depth to the channel.

Dan C. Kingman,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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POTOMAC RIVER AT COLONIAL BEACH, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF POTOMAC RIVER AT COLONIAL BEACH, VA., WITH A VIEW TO A PROPER APPROACH TO THE LANDING PLACE.

December 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, December 10, 1912.

Sir: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, together with copy of a report from Lieut. Col. W. C. Langfitt, Corps of Engineers, dated July 20, 1911, of a preliminary examination of Potomac River at Colonial Beach, Va., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, November 9, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination Potomac River at Colonial Beach, Va.

1. There is submitted herewith, for transmission to Congress, report dated July 20, 1911, by Lieut. Col. W. C. Langfitt, Corps of

Engineers, on preliminary examination of Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place, authorized by the river and harbor act approved February 27, 1911.

2. Potomac River is several miles wide in this vicinity, the main ship channel being located about 2 miles distant from the wharves at Colonial Beach. The improvement desired appears to be an auxiliary channel 200 feet wide and 20 feet deep, departing from the main channel at a suitable point above the beach, passing near the wharves and reentering the main channel below, to permit the large vessels plying between Washington and Norfolk and Washington and Baltimore to handle the commerce of the locality instead of its being handled by the general run of vessels engaged in commerce on the river, for which the present depth is sufficient. In the opinion of the district officer it is not advisable for the General Government to undertake this improvement at the present time. The division engineer concurs in this opinion.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose report, dated April 8, 1912, concurring in the opinion expressed by the district officer and the division engineer, attention is invited.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

H. Taylor,
Lieut. Col., Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, April 8, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This is a report on preliminary examination of Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place. It will be seen from an examination of a map (not printed) of this locality that the river is several miles wide and that the main through ship channel is located about 2 miles distant from the wharves at Colonial Beach.

3. The improvement desired appears to be an auxiliary channel 200 feet in width and 20 feet in depth, departing from the main channel at a suitable point above the beach, passing near the wharves and reentering the main channel below. Commercial and navigation interests suggest using Colonial Beach as a central point for the

assemblage and distribution of freight, the plan being to collect the products of the adjacent country by means of the moderate-draft boats now in use on the Potomac and tributary streams, to be called for by the larger steamers plying between Washington and Norfolk and Washington and Baltimore, and for these through boats to leave at this central point for distribution the merchandise, etc., required by the adjacent country. In addition to the channel referred to, a turning basin will be required. Such a channel would be several miles in length and would probably be expensive.

4. The present commerce is reported as amounting to about 7,546 tons, having a value of $404,000. Quite a number of passengers are landed at Colonial Beach during the season, this being a summer resort. These passengers are not carried on the through boats, however, but on vessels of such draft as can now reach the wharves. It appears that the present depth is sufficient to accommodate the general run of vessels engaged in commerce on the Potomac River, and that the improvement now desired is solely for the purpose of permitting the large through vessels to handle the commerce instead of those now in use. The commerce reported is not large, and there are no extensive manufacturing or commercial industries in this section of country to create a commerce of great magnitude. It is quite probable that a large part of the commerce of the locality would still be carried on the regular Potomac boat lines even if the improvement were made, and therefore the tonnage to be handled by the through boats would be comparatively small. Moreover, as suggested within, this may not be the best location for a point of assemblage and transfer of the commodities of this section of country if the interests of the public at large are considered.

5. On March 11, 1912, Hon. Thomas S. Martin and Hon. Claude A. Swanson, United States Senators, appeared before the board in behalf of the proposed improvement, and subsequently a communication was received from interested parties relative to the draft of boats that were expected to use the improved waterway.

6. In view of the facts briefly outlined above and given more in detail within, the board concurs with the district officer and the division engineer in the opinion that at the present time it is not advisable for the General Government to undertake the improvement of the Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place, and in compliance with law the board reports that there are no questions of water power, terminal facilities, or other related subjects having any material bearing upon the improvement under consideration.

For the board:

H. C. Newcomer,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF POTOMAC RIVER AT COLONIAL BEACH, VA.

United States Engineer Office,
Washington, D. C., July 20, 1911.

Sir: 1. In compliance with letter, Office Chief of Engineers, dated April 7, 1911, I have the honor to submit the following report on preliminary examination of Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place, authorized by river and harbor act approved February 27, 1911.

2. Colonial Beach is situated on the right bank of Potomac River in Westmoreland County, Va., and about 68 miles below Washington, D. C. It is a flourishing town and summer resort, with a summer population of several thousand and a winter population of about 600. There are 9 hotels, 28 licensed boarding houses, and a large number of cottages. The surrounding section of Virginia is on the northern neck or peninsula formed by the proximity of the Potomac and Rappahannock Rivers, the latter river in a direct line being about 10 miles from Colonial Beach.

3. The reach of the river in front of Colonial Beach, known as Kettle Bottom Shoals, presents the most difficult problems in the navigation of Potomac River. The river bed is studded with oyster-rock mounds of conical or spire-like forms, rising to heights of 5 to 12 feet above the natural river bottom. Ships have grounded on these mounds or lumps, and in some cases have received serious injuries. The hydrographic sheets from the surveys made by the Coast and Geodetic Survey are at hand and show numerous lumps between the channel now in use and the shore in front of Colonial Beach. The General Government, appreciating the difficulty in the navigation of this channel, made an improvement by dredging a deep ship channel near the Maryland shore, where fewer lumps are encountered, and this channel has been marked with ranges visible during the day and lighted at night. The usual channel used by deep-draft boats is thus located about 2 miles offshore from Colonial Beach, and the intervening water has a depth of 9 to 16 feet for half the way from the wharves, and 16 to 20 feet for the other halfway.

4. The river and harbor act, approved July 5, 1884, provided for a preliminary examination and survey of Colonial Beach, formerly White Point, in county of Westmoreland, Va. Preliminary examination and survey was made pursuant therewith and the reports thereon are published in Annual Report of the Chief of Engineers for the fiscal year 1885, pages 1001 to 1005. From the records it does not appear that any action was taken on these reports. The United States agent recommended dredging a single channel of approach, 16 feet deep, 300 feet wide, and 2,050 feet in length, at an estimated cost of $20,800. This channel would not conform in any respect to the present desires or needs. A turning basin would be needed, extending in front of both the present wharves, or two turning basins would be necessary. This would add greatly to the expense and probably make such a plan approach in cost that of the through channel now requested, without its advantages. (Appendixes D and E.[1])

5. The steamboat lines landing at Colonial Beach and plying between Washington and Potomac River points are operated by the Potomac & Chesapeake Steamboat Co., with three or four boats giving a daily service each way, excepting Friday and Saturdays, when the service is one way. During the summer months the Colonial Beach Co. operates one steamer, giving daily service each way except on Monday. The Popes Creek Packet Co. operates a small steamer

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[1] Not printed.

between Colonial Beach and Popes Creek, Md., the present terminus of the Popes Creek Division of the Pennsylvania Railroad, making a trip and return every week day. This is the nearest railroad connection and, in fact, the only one within many miles. The drafts of the boats now landing at Colonial Beach are from 6 to 9 feet.

6. A duly advertised public hearing was held at Colonial Beach, Va., on May 11. During this hearing the following pertinent subjects were introduced:

(a) Scope of improvement desired; location, length, depth, and width.

(b) Purpose of proposed improvement and the benefits to be expected therefrom.

(c) Cooperation to be given, if any, and by whom.

(d) Coordination to water power, industrial interests, etc.

(e) Terminal facilities; present wharves and future betterment thereof.

(f) Present commerce and prospective increase by proposed improvement.

The interested parties discussed these subjects in an informal way, but as no definite ideas were offered 30 days' time was requested in which to submit in writing a report on the subject. To date, three such reports[1] have been received, and are attached hereto as Appendixes A, B, and C.

7. It appears from these papers that the improvement desired is a channel 20 feet deep by 200 feet wide, leaving the main channel at some distance above the wharves and entering the main ship channel again at some distance below. A turning basin in front of the wharves is also suggested. The channel desired would have a rainbow or crescent shape, and would extend from the point of its departure to the point of entrance to the main ship channel, a total distance of about 3 miles. The whole zone through which this channel would have to be made would require that all oyster mounds be located by a sweep specially constructed for such work, and would require the removal of all such mounds within the zone as well as buoying the mounds adjacent thereto. It is evident that the work desired would form a relatively expensive improvement.

8. The purpose of proposed improvement is to permit the through steamers plying between Washington and Norfolk and Washington and Baltimore landing facilities at Colonial Beach, and to afford an assembling point for local freights to be collected by the boats at present plying the Potomac River for the purpose of transshipment by the through lines above mentioned.

9. The present commerce consists of receipts and shipments of lumber, oil, building materials, coal, flour, general merchandise, etc., amounting annually to about 7,546 tons, valued at $404,070. The number of passengers landing and embarking at Colonial Beach during 1910 is stated to be 86,000 (see Appendix D). Prospective commerce is to comprise the increase in receipts and shipments due to the development of the land and the feature of assembling freights from other landings in the vicinity. No estimate can be given of the amount of increase to be expected. If the scheme is carried out successfully, a large increase at Colonial Beach would result, due to the collection of freight by the smaller vessels. This would not be new commerce, but simply taking advantage of a new facility. Actual new business would be of slow and gradual development.

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[1] Not printed.

10. There are no water-power possibilities, and there are no questions of flood control of drainage or reclamation that can be coordinated with the project in any way, so as to compensate the Government for expenditures made in the interests of navigation. It was stated at the hearing that efforts would be made to interest the Agricultural Departments of the United States and the State of Virginia in developing the lands now not tilled into truck farms, or into producing grains or fruits.

11. No cooperation, either from the town authorities or the local steamboat lines, is offered, notwithstanding the fact that the Colonial Beach Co. last summer proposed to do the necessary dredging to allow the Norfolk line entrance to their wharf. A permit for the said dredging was granted by the department on June 27, 1910, and expired six months later by limitation, without any work having been done.

12. The terminal facilities at present available consist of one wharf under municipal control, the wharfage revenue therefrom going to the town of Colonial Beach, and another wharf, about six or seven hundred yards above the municipal wharf, owned and controlled by the Colonial Beach Co., used exclusively for the landing of passengers and for excursion purposes. A small coal wharf also exists in front of the electric power plant, and about 1 mile above the excursion pier there is a short wharf belonging to the Classic Shore addition to Colonial Beach. The present depths at the municipal wharf are about 9 feet, and at the Colonial Beach Co.'s wharf, about 11 feet. The range of tide is about 1.7 feet. There are no mechanical facilities for handling freight. In regard to the future betterment of the present terminal facilities, assurance is given that proper wharves, warehouse, and other facilities will be provided if the channel is dug to accommodate the through steamers. Any work done by the General Government should be conditional on extension of wharf facilities to all on equal terms, and that the municipal wharf shall be maintained in good repair and of sufficient size to accommodate all business offered.

13. The need of some assembling point for collection and transshipment of freight in the vicinity of Colonial Beach is appreciated and thought to be an economical method of caring for the products of the country. It is believed that a method of this kind, more than any other, would tend to develop the agricultural pursuits and make this country, which is at present largely undeveloped, a prosperous section.

14. The advisability of locating the assembling point at Colonial Beach, adjacent to a reach of river filled with dangerous obstructions, may be doubted. Some other landing above or below Kettle Bottom Shoals, easier of access, can, no doubt, be found, and will be the most logical assembling point. The only disadvantage that can be seen in placing an assembling point away from Colonial Beach is that the inhabitants thereof would not reap the benefits directly of the through boats landing at their door. Passenger traffic to and from Colonial Beach by the through boats would not be so conveniently accommodated, and possibly the development of the resort somewhat retarded. This objection, in a measure, could be overcome by using an inexpensive ferry service to the assembling point selected.

15. About 1 mile farther upstream, in the vicinity of the Classic Shore, a much less expensive connection with the main channel to wharves of reasonable length could be made. Such location would involve new wharves both by the steamboat lines and by the municipality, and would not be satisfactory to either on that account. A number of large bowlders are reported in the river in this locality. The question of depth needed in, and of making the channel straight in toward the beach, with turning basins at the wharves, the channel to branch to the wharves, was taken up in letters, dated June 21, to the Norfolk & Washington Steamboat Co., the Potomac & Chesapeake Steamboat Co., the Maryland, Delaware & Virginia Railway Co., and the mayor of Colonial Beach. A personal visit was made to Colonial Beach on June 23, and the matter again discussed with the mayor and other local interests. Two replies[1] have been received, one from the Maryland, Delaware & Virginia Railway Co. and one from the Potomac & Chesapeake Steamboat Co. While the former reply is more or less favorable to such modification and to less depth, it is to be noted that this company's boats have never stopped at Colonial Beach, and the fact that they will do so appears not to be assured. The reply of the Potomac & Chesapeake Steamboat Co. is unfavorable both to less depth than 20 feet and to the suggested modification of plan.

16. In view of the evident large cost of the work desired, and for the reasons advanced in paragraph 14, I am of the opinion that the improvement of the Potomac River at Colonial Beach, Va., with a view to a proper approach to the landing place is not worthy of being undertaken by the General Government at the present time.

Very respectfully,

W. C. LANGFITT,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, August 2, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see page 2.]

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[1] Not printed.

62D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1128.

BASS HARBOR BAR AND DEER ISLAND THOROUGHFARE, ME

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF BASS HARBOR BAR AND DEER ISLAND THOROUGHFARE, ME.

DECEMBER 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, December 10, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 25th ultimo, together with copies of reports from Lieut. Col. W. E. Craighill, Corps of Engineers, dated August 28, 1911, September 13, 1912, and November 1, 1912, with maps, on preliminary examination and survey, respectively, of Bass Harbor Bar and Deer Island Thoroughfare, Me., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 25, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Examination and survey of Bass Harbor Bar and Deer Island Thoroughfare, Me.

1. There are submitted herewith, for transmission to Congress, reports dated August 28, 1911, September 13, 1912, and November 1, 1912, with maps, by Lieut. Col. W. E. Craighill, Corps of Engineers, on

preliminary examination and survey, respectively, of Bass Harbor Bar and Deer Island Thoroughfare, Me., authorized by the river and harbor act approved June 25, 1910.

2. Bass Harbor Bar is a shoal extending from the southerly extremity of Mount Desert Island. Deer Island Thoroughfare is a narrow passage about 9 miles long on the southerly side of Deer Island. Both of these localities are on the route used by the many small coasting vessels and steamers plying along the coast of Maine, and the latter is also used by vessels engaged in taking stone from Stonington, which is situated in a cove on the northerly side of the thoroughfare. The improvement desired in each case is an increase in channel dimensions to render navigation safer.

3. The plan recommended by the district officer for improvement of Bass Harbor Bar contemplates the excavation of a channel not less than 14 feet deep at mean low tide for a width of 250 feet across the bar at an estimated cost of about $10,000. (It is believed that there will be no maintenance work required, and no estimate therefor is submitted.) For the improvement of Deer Island Thoroughfare the district officer proposes to remove obstructing ledges to a depth of 15 feet at mean low tide, for a width of about 300 feet. The cost of this work is estimated at $40,000 and it is believed that no expenditures for maintenance will be required.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose report dated November 11, 1912, attention is invited. The board and the division engineer concur in the opinion expressed by the district officer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Bass Harbor Bar and Deer Island Thoroughfare, Me., is deemed advisable so far as to secure an available channel depth of 14 feet at Bass Harbor Bar and 15 feet at Deer Island Thoroughfare, with channel widths of 250 feet and 300 feet, respectively, increased at entrances and on curves, following in general the methods described in the report of the district officer, at estimated costs of $10,000 and $40,000, respectively, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost.

H. TAYLOR,
Lieut. Col., Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 11, 1912.

TO THE CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. As stated in the report on preliminary examination, Bass Harbor Bar and Deer Island Thoroughfare are distinct places about

15 miles apart, though they are on the same route and are used by the same class of vessels. The authorized surveys of these localities having been made by the district officer, he submits for the improvement of Bass Harbor Bar a plan contemplating the excavation and marking of a channel not less than 14 feet deep at mean low tide for a width of 250 feet across the bar at the location shown on the accompanying tracing. This work is estimated to cost not to exceed $10,000, and it is believed that there will be no cost for maintenance except for the preservation of the channel marks. For Deer Island Thoroughfare he proposes to excavate the ledges lying within the area shaded on the related tracing to a depth of 15 feet at mean low tide, for a width of about 300 feet, which will in fact afford a width of about 400 feet to the depth indicated. It is estimated that this work will cost $40,000. All material above a plane of 15 feet below mean low tide is bare ledge, indicating that there will be no maintenance charge.

2. No new data regarding the commerce using these passages were secured during the progress of the survey except such as corroborate the information given in the report on preliminary examination, in which the general character of commerce using this route was described and explanation given of the need for improvement of the localities in the interests of the many small vessels plying along the coast, as well as for the regular steamers engaged in freight and passenger transportation. As a result of his further investigations, the district officer is convinced that the work outlined should be undertaken for the betterment of navigation at these localities, and the division engineer concurs in his recommendations. After due consideration of the facts presented, the board believes that it is advisable for the United States to undertake the improvement of Bass Harbor Bar and of Deer Island Thoroughfare to the extent indicated above at estimated costs of $10,000 and $40,000, respectively. If the work is authorized, the full amount of the estimate for each locality should be appropriated at one time.

3. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF BASS HARBOR BAR AND DEER ISLAND THOROUGHFARE, ME.

United States Engineer Office,
Portland, Me., August 28, 1911.

Sir: 1. I have the honor to submit the following report on a preliminary examination of Bass Harbor Bar and Deer Island Thoroughfare, Me., directed by the river and harbor act approved June 25, 1910.

2. Though these two localities—Bass Harbor Bar and Deer Island Thoroughfare—are named jointly in the order for examination, they

are two separate and distinct places, about 15 miles apart, though on the same route of travel for a large class of vessels, and it is presumably on this account that they are named together in the act of 1910.

3. While much of the commerce is common to both places, yet for a clear understanding it will be necessary to discuss them separately.

BASS HARBOR BAR.

4. Bass Harbor Bar is a shoal extending from the southerly extremity of Mount Desert Island a distance of about 1 mile to Great Gotts Island. For probably one-half the distance nearest to Mount Desert Island the bar is about one-eighth of a mile across and the water deepens rapidly on each side. There is a lighthouse on Bass Harbor head at the northerly end of the bar. The locality is shown on Coast Survey Chart No. 308, which indicates a depth of about 12½ feet across the bar through a narrow channel about one-eighth of a mile south of the light. It is claimed, however, by mariners that there is only about 11 feet at low water, that the channel is crooked with some bowlders, and that when the sea is running only the shoalest vessels may attempt to cross.

5. I personally inspected the locality June 23, 1911. It is impracticable to give definite statistics as to the commerce at this place. Much of the great movement of small coasting vessels and steamers along the coast of Maine uses the passage. The small coasting vessels which are moving throughout the year run along the coast from harbor to harbor, coming in at night or when the weather is threatening. This necessitates their keeping close to the coast. Bluehill Bay under the lee of Great Gotts, Placentia, and Swan Islands affords good shelter. The wide passage to the southwest would seem to afford a better opportunity, but skippers—and I have talked with several—claim that in coming from the east on the approach of darkness they have to run for Bass Harbor Head light, the only one near, and to secure shelter necessitates crossing the bar. Besides this it is a more direct passage. Towboats are not available on that part of the coast, and in the event of light winds with darkness coming on, or of snowstorms or fogs threatening, it behooves these small craft to secure shelter and to do it as quickly as possible. Aside from the great number of coasting vessels there are regular lines of steamers of the Eastern Steamship Co., Maine Central Railroad Co., Vinalhaven & Rockland Steamboat Co., and Maine Coast Transportation Co. The Sagadahoc Towing Co., which is engaged in the business of towing barges along the coast, states that its tonnage amounts to some 24,000 tons. The movement of lime, stone, and other products by coasting vessels is beyond my resources to estimate, but I am satisfied that it is so important that it should receive serious consideration.

6. What appears to be desired at this locality is that a channel shall be cut through the bar. One interest, the Sagadahoc Towing Co., calls for a depth of 20 feet at mean low tide for a width of at least 300 feet. Other needs, depending on the character and size of the vessels interested, vary from a mere removal of some of the bowlders to the securing of a straight channel 12 to 15 feet in depth.

7. It is evident that there are no matters of water power development or land reclamation which can enter into a project for improvement at this locality. Nor does the matter of wharf or terminal facilities have any bearing.

8. It is my opinion that Bass Harbor Bar is worthy of improvement by the National Government, providing anything of practical benefit can be accomplished at a very moderate cost, which seems to me to be a reasonable probability, and provided also that there are good prospects that such a channel will keep open without assistance. The cost of a survey will be small, and in order to collect the data necessary to a conclusion in these respects it is recommended that a survey be made, the cost of which should not exceed $300.

DEER ISLAND THOROUGHFARE.

9. Deer Island Thoroughfare is a narrow passage about 9 miles long on the southerly side of Deer Island, which lies on the eastern side of the entrance to Penobscot Bay. The locality is shown on Coast Survey Chart No. 309. It separates Deer Island from a multitude of islands and ledges to the south. The thoroughfare itself is much obstructed by ledges, though it is a much favored road and the one most extensively used, especially by small craft, for similar reasons to those given above in the case of Bass Harbor Bar. It is extensively buoyed and is a dangerous passage to attempt except in the daytime, but, being inside and affording good chances for harbor, is greatly used. While it might seem from a scrutiny of the chart that other passages, especially the one indicated as Merchants Row, might be easier and safer, yet the practical fact remains that vessels insist on going via Deer Island Thoroughfare.

10. This locality is in the midst of a great granite district, and all transportation is of necessity conducted by water. Stonington, which lies on a cove on the northerly side of the Thoroughfare, is a place of considerable importance. There are a number of large granite quarries located along the Thoroughfare and the shipments of stone out, and of supplies in, give rise to considerable commerce aside from that simply passing through. The Maine Central Railroad Co.'s boats make daily round trips four months and two trips per week the balance of the year. The Eastern Steamship Co. runs on the same schedule. The Vinalhaven & Rockland Steamboat Co. makes a daily round trip the year around. The Maine Coast Co. steamers make two trips per week. The sailing vessels which frequent Stonington are from 78 to over 200 feet in length and draw from 7 to 24 feet. The receipts and shipments at Stonington alone are said to amount to about 50,000 tons per annum and the passengers to number from 2,200 to 2,500 per month over one line alone. Mr. John L. Goss, who has large granite quarries, states that there are from 150 to 200 sail per year which take stone from Stonington. The material is distributed all along the Atlantic coast as far south as Galveston. Shipments designed for the interior are carried to railroad points and there reshipped, much of it going through Boston. Vessels coming from the west at night are obliged to stay out in the bay, whereas if the channel were better it is claimed that after making Mark Island Light (Thoroughfare Light) they could go into the Thoroughfare and reach safe anchorage. In addition to the

tonnage given for Stonington must be added the 24,000 tons handled annually by the Sagadahoc Towing Co. and the great amount of coastwise traffic which I am unable to even estimate.

11. I visited this locality personally June 21, 1911, and my conclusions are the result of my observations as well as interviews and correspondence with others. What is desired is the removal of a few of the more obstructive ledges at and near Stonington.

12. There are no matters of water-power development or land reclamation which can be considered in connection with a project for the improvement at this locality. The stone interests have wharves and terminal facilities sufficient for handling large quantities of material, and many of them are fitted with derricks of considerable capacity. As most of the business consists in this special line of manufacturing or output, and not in general commerce, the matter of wharves and terminal facilities can be safely left to take care of itself. There are abundant wharf sites to be had, and the accommodations undoubtedly can be relied upon to keep pace with the need without any demands on the part of the Government.

13. It is my opinion that Deer Island Thoroughfare is worthy of improvement by the National Government, provided the cost is not excessive. A preliminary examination does not develop this feature satisfactorily, and I think the locality is fully deserving of such further investigation as would result from a survey, which I have the honor to recommend be authorized. The cost should not exceed $800.

Very respectfully,

W. E. CRAIGHILL,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through Division Engineer).

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 31, 1911.

1. Respectfully forwarded to the Chief of Engineers, United States Army.

2. Bass Harbor Bar: From personal experience along the coast of Maine, I know that the difficulties experienced by navigators in the neighborhood of Bass Harbor Head are not overstated by Lieut. Col. Craighill. A very large amount of traffic, both passenger and freight, passing east along the coast of Maine skirts Mount Desert Island very closely and, coming from the east, passing through Eggemoggin Reach and the Deer Island Thoroughfare, thence through Casco Passage north of Swan Island or through the broader channel to the north of Pond Island, heads for Bass Harbor Light. Lieut. Col. Craighill's recommendations are concurred in.

3. Deer Island Thoroughfare: From a personal knowledge of the locality in question, Lieut. Col. Craighill's recommendations are concurred in.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 11, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. Bass Harbor Bar is a shoal extending from the southerly extremity of Mount Desert Island, Me. Coast Chart No. 308 shows a depth of 12½ feet through a narrow channel across the bar, but mariners claim that there is only about 11 feet at low water, that the channel is crooked with some bowlders, and that when the sea is running only the lightest draft vessels may attempt to cross. The passage is used by many small coasting vessels and steamers plying along the coast of Maine, and while the commerce is not susceptible of even approximate determination, the district officer is satisfied that it is of sufficient importance to receive serious consideration. The improvement desired is a channel of suitable dimensions across the bar. The district officer believes the locality worthy of improvement, provided anything of practical benefit and reasonable permanence can be accomplished at moderate cost. To determine these questions he recommends the authorization of a survey at an estimated cost of $300.

3. Deer Island Thoroughfare is a narrow passage about 9 miles long on the southerly side of Deer Island, Me., and is shown on Coast Chart No. 309. It is much obstructed by ledges and is a dangerous passage to attempt except in the daytime, but being inside and affording good chances for harbor it is greatly used, especially by small craft. This locality is in the midst of an important granite district, and the outward shipment of stone and inward shipment of supplies afford a commerce of considerable importance, the transportation of which is necessarily by water. Stonington, which lies in a cove on the northerly side of the Thoroughfare, is a place of considerable importance, and is visited by several regular lines of steamers making daily or semiweekly trips. It is stated that from 150 to 200 sail per year take stone from Stonington, and the commerce of this place alone is said to amount to about 50,000 tons per annum. The improvement desired is the removal of the more obstructive ledges at and near Stonington. The district officer believes the locality is worthy of improvement provided the cost is not excessive, and to determine this question he recommends a survey at a cost of not to exceed $800.

4. Having in mind the large commerce that is carried along this part of the coast, mainly in numerous small vessels which must seek the more protected routes, the board concurs with the district officer and division engineer in recommending the authorization of surveys as specified above, with a view to ascertaining the practicability of accomplishing useful and reasonably permanent improvements at justifiable expense.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, September 15, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Bass Harb Bar and Deer Island Thoroughfare, Me., authorized by the river an harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers f Rivers and Harbors in the preceding indorsement, I recommend tha a survey of the locality, as proposed, be authorized.

H. TAYLOR,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT, *September 15, 1911.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF BASS HARBOR BAR AND DEER ISLAND THOROUGHFARE ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., September 13, 1912.

From: Lieut. Col. W. E. CRAIGHILL, CORPS OF ENGINEERS.
To: The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through division engineer).

Subject: Survey of Bass Harbor Bar and Deer Island Thoroughfare, Me.

1. The river and harbor act approved June 25, 1910, directed a preliminary examination of Bass Harbor Bar and Deer Island Thoroughfare, Me. Report on this subject was submitted August 28, 1911, and as a result of the information obtained and submitted surveys were ordered, and it is in connection with this work that the following report is submitted.

2. As stated in the report on the preliminary examination, though these two localities are named jointly, they are separate and distinct places about 15 miles apart, but on the same route used by a large class of vessels.

BASS HARBOR BAR.

3. Data obtained by a survey at this locality is shown on tracing herewith, indicated as sheet No. 1. Characteristic soundings indicate that the best crossing is probably about 800 feet south of the lighthouse and show at that place apparently about 14 feet at mean low tide for a width of about 300 feet over the crest of the bar, which at that place is about 250 feet across, between the 15-foot contours. If work of improvement be undertaken it should be at this particular place for the following reasons: It is believed that better width and depth can be secured here at less cost than at any other place. While there is apparently fairly good water immediately to the north of the

11½-foot shoal, to secure the necessary width would involve much expense for ledge excavation, and it lies too close to the shore to make it safe in all winds. All the data showing soundings is, however, to be taken with reservation. The place is very rough, and a number of days passed before the surveying party could do satisfactory work on the bar. Lines of soundings were taken, but it was considered necessary to use a sweep, and while the data on the tracing as before stated, shows characteristic soundings, numerous bowlders and small patches of ledge which showed less depth were found in sweeping to such degree that developed it would not do to depend on a safe depth greater than 13 feet for a width of about 250 feet. Owing to the rough conditions maintaining on this bar fully satisfactory determination of the character and extent of the bottom was found impracticable within the scope of reasonable expense.

4. No new and reliable data was secured as to the commerce and other interests involved, except such as corroborate the information given in my report on the examination. At the time of the survey 22 schooners were counted at anchor in the harbor just to the west of the bar which had either just crossed or were awaiting an opportunity to do so. The party was on the work but a short time, as the operation was not extensive when once suitable weather conditions prevailed. Such information as was obtained strengthens my opinion that something should be done at this locality and that if a channel can be cleared across the bar it will be of great value to the multitude of sailing craft and passenger steamers that use the passage the year around and also to a great number of yachting craft which visit this part of the coast during the summer.

5. It is my impression that there is ignorance concerning the best place for crossing the bar. One steamboat captain indicated his habitual course as one which would take him directly across the 11½-foot shoal, which contains obstructions over which there is but 10 feet. Furthermore, the passage has not been satisfactorily marked. The tidal currents across the bar are strong, and without full favoring winds sailing vessels are usually obliged to wait for a favoring set of the current.

6. As a result of further investigation and personal interviews with a number of masters of vessels which regularly and frequently cross Bass Harbor Bar, I am of the opinion that work at that locality is justified, though I am unable to give any definite figures as to the character or amount of the commerce. It is a matter of common knowledge that this route is much frequented by a great number of coasting craft of whose movement there is no reliable record. The steamboat use is indicated in my report on the preliminary examination. The project suggested is one which I believe to be fully justified by the benefits to be derived and provides for a depth of not less than 14 feet at mean low tide for a width of 250 feet across the bar at the place shaded upon the tracing. This can be accomplished, it is estimated, at a cost not to exceed $10,000. The work is of such character that it is not believed that satisfactory specifications can be drawn, and it will doubtless mean that such amount will be applied by the use of hired plant and day labor, involving submarine divers. It will be necessary at the same time to mark the channel, which I think should be done probably with two or more spindles, it being difficult to maintain anchored buoys on the bare

ledge exposed to heavy seas. Owing to the exposed position an the hard bottom, there must be no question as to the integrity of th marks.

7. It is believed that there will be no cost for maintenance in con nection with this work, except possibly what may be needed to kee the spindles or marks in order.

8. Nothing less than the full extent of improvement indicate above will be of any aid to commerce, so that I think that if the wor be undertaken by the Government it should be done under a singl appropriation of the full estimated amount.

DEER ISLAND THOROUGHFARE.

9. The results of the survey at this place are shown on the accom panying tracing, marked "Sheet No. 2."

10. It develops that the obstructions to navigation lie at th westerly end of the thoroughfare, where the depth in general is good but with numerous points of ledge projecting above the bottom i such number and in such positions as to make the passage bot difficult and dangerous.

11. Information collected during the progress of the survey confirms the data submitted in my examination report, and also th desirability of work of improvement at this locality. On one da during the survey 37 schooners passed through. This, it is believed represents a fair average day's business. Some of them had to b towed. Most of the vessels, perhaps nearly all, passing over Bas Harbor Bar also go through Deer Island Thoroughfare, and a larg additional number load at the quarries in the immediate neighborhood. Besides the business to which reference was made in my report on the examination a great number of yachts use the thoroughfare, partly because of its being a protected route and partly because of the great scenic beauty for which the place is justly celebrated.

12. It may be observed from the map that the obstructing ledges give depths as shallow as 7 feet at mean low tide and that they lie within a longitudinal distance of about 1,300 feet. While there is a towboat stationed at Stonington, most of the craft make through under sail, so that a fair width is necessary in order to accommodate navigation. The improvement which I suggest for this place is to excavate to a depth of 15 feet at mean low tide the ledges lying within the area shaded on the tracing, or for a width of about 300 feet, which will in fact afford a width of about 400 feet to the depth indicated. This work will, it is estimated, cost $40,000, and will involve the excavation of about 3,050 cubic yards of ledge.

13. All material above a plane of 15 feet below mean low tide is bare ledge, and I am assured from this and other indications that there will be no maintenance charges.

14. It is my opinion that the interests involved at this locality and the great convenience and safety which will be secured thereby fully justify this expenditure by the General Government.

15. In the interests of commerce, as well as the fact that the improvement would have to be practically completed before being of essential service, the whole estimated cost should be provided at a single appropriation and the work accomplished within a single working season.

W. E. CRAIGHILL.

[First indorsement.]

OFFICE OF DIVISION ENGINEER,
NORTHEAST DIVISION,
New York City, September 18, 1912.

To THE CHIEF OF ENGINEERS, UNITED STATES ARMY.

From personal knowledge of the localities, as well as from the reports of the preliminary examination and survey, I concur in the recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for rivers and harbors on survey, see p. 2.]

SUPPLEMENTAL REPORT ON SURVEY OF BASS HARBOR BAR AND DEER ISLAND THOROUGHFARE, ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., November 1, 1912.

From: Lieut. Col. W. E. CRAIGHILL, CORPS OF ENGINEERS.
To: The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through division engineer).

Subject: Survey of Bass Harbor Bar and Deer Island Thoroughfare, Me.

1. I have received by department indorsement dated October 26, 1912, a letter addressed to the Chief of Engineers, United States Army, from the Board of Engineers for Rivers and Harbors concerning my report submitted January 16, 1912, on the survey of Bass Harbor Bar and Deer Island Thoroughfare, Me.

2. The board states as follows:

> 1. The board has under consideration the report of the district officer on survey of Bass Harbor Bar and Deer Island Thoroughfare, Me. These localities are about 15 miles apart, and the district officer states that they are on the same route used by a large class of vessels. He submits a plan of improvement which provides for a depth of 14 feet at Bass Harbor Bar and a depth of 15 feet at Deer Island Thoroughfare. It is not clear to the board why there should be a depth of 15 feet at the latter if a depth of 14 feet will serve at the former, particularly as the Bass Harbor Bar channel appears to be more exposed than the one through Deer Island Thoroughfare. A reduction of 1 foot in the depth over the Deer Island Thoroughfare would materially lessen the cost.
>
> 2. The board requests that the district officer be asked to furnish information on this subject, and also regarding the draft of the vessels engaged in traffic through these channels.

3. It is true that the passage via Deer Island Thoroughfare and Bass Harbor Bar is on the same route used by a large class of vessels, but a further explanation is necessary to a clear understanding of the matter. Aside from other traffic Deer Island Thoroughfare is in the center of large granite industries and many vessels coming from the westward go no farther, but load at this place and return. As indicated in my report on the preliminary examination, dated August 28, 1911, the sailing vessels which frequent Stonington, a place of some importance on Deer Island Thoroughfare and in the midst of the granite industry, are from 78 to over 200 feet in length and draw from 7 to 24 feet. Deer Island Thoroughfare is a passage of recognized importance, is quite fully buoyed, and a part at least of its commerce can be definitely stated and its needs definitely known. There is

fairly good water, but the passage is crooked, due to a number of dangerous ledges in irregular positions. My recommendation as to a project for this place, viz, 15 feet at mean low water, was made because, in my judgment, the amount of traffic and the resulting benefit would justify the estimated cost of $40,000, because at least that depth was needed, and because the physical conditions allowed of such a project at moderate cost. Greater depth would be unduly expensive, and less will not adequately meet reasonable needs.

4. The depth suggested for Deer Island Thoroughfare is the result of a consideration of various factors pertaining to the situation. The demand of the most prominent interests was for a depth of 18 to 20 feet. The project suggested was that which would produce, in view of physical conditions, the greatest possible benefit at a reasonable expenditure. A greater depth would rapidly increase the cost, a depth of 18 feet for a width of 300 feet being estimated to cost about $145,000. Anything less than 15 feet would scarcely provide an improvement worthy to be undertaken in the interest of navigation.

5. At Bass Harbor Bar the case is somewhat different. At Deer Island Thoroughfare the suggested project extends over a longitudinal distance of about 1,300 feet. At Bass Harbor Bar the crest of the bar is about 300 feet across. Much, in fact most, of the heavier traffic does not go beyond Deer Island Thoroughfare, but as to such as does go beyond heavier and larger vessels can take the deep and wide passage to the south and west of Bass Harbor Bar. (See Coast Survey Chart No. 308.) The improvement at Bass Harbor Bar was suggested in the interest of the small craft only, drawing, say, up to about 12 feet. As there is no local traffic at this place it was and is impracticable to do more than give a general impression of the business. A study was made of the situation, and 14 feet at mean low tide for a width of 250 feet across the bar is, in my opinion, all that is warranted at this locality, which it is estimated can be secured at a cost of $10,000. One interest desired a depth of 20 feet at mean low tide, but the cost of this was prohibitive, as it is estimated that a depth of 20 feet for a width of 300 feet would cost nearly $700,000. A depth of 16 feet for a width of 200 feet across the bar was estimated to cost about $84,000. A depth of 15 feet was estimated to cost about $50,000. There appeared to be no justification for the expenditure of these large amounts, and my recommendation for a 14-foot depth was in the interest of the smaller craft only.

W. E. Craighill.

[First indorsement.]

Office of Division Engineer,
Northeast Division,
New York, November 5, 1912.

To Chief of Engineers, concurring in Col. Craighill's recommendations.

W. M. Black,
Colonel, Corps of Engineers.

O

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1129.

BRULE HARBOR, WIS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF BRULE HARBOR, WIS.

December 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed with illustration.

War Department,
Washington, December 10, 1912.

Sir: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 18th ultimo, together with copies of reports from Lieut. Col. F. R. Shunk, Corps of Engineers, dated January 26 and August 3, 1912, with map, on preliminary examination and survey, respectively, of Brule Harbor, Wis., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, November 18, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey, Brule Harbor, Wis.

1. There are submitted herewith, for transmission to Congress, reports dated January 26 and August 3, 1912, with map, by Lieut. Col. F. R. Shunk, Corps of Engineers, on preliminary examination and

survey, respectively, of Brule Harbor, Wis., called for by river and harbor act approved February 27, 1911.

2. Brule Harbor is situated within the lower end of Brule River on the south shore of Lake Superior, about 25 miles from Duluth-Superior Harbor. The river is navigable only for the floating of logs except in the lower half mile where the harbor is situated and where a depth of from 2 to 4 feet exists over a width of from 100 to 150 feet. The mouth is obstructed by a bar, over which a depth of about 2 feet exists. The only improvement has been by local interests, who have previously closed the old channel and cut a new one at the mouth, protected by timber-crib revetments about 60 feet apart. A depth of 6 feet is available between these revetments.

3. The district officer presents a plan for improvement involving the dredging of a channel 6 feet deep through the bar, protected by jetties and extending into the river for a short distance at an estimated cost of $16,500, and $1,500 annually for maintenance. It appears from his report that there is no town at this harbor and but little commerce; that the surrounding country is but sparsely settled; that the forest products of the surrounding territory are practically exhausted; and that local interests desire improvement of the harbor in the belief that it would result in great development of the lands for farming purposes with a consequent large water-borne commerce of farm products.

4. The district officer is of the opinion, however, that the harbor would be chiefly used as a harbor of refuge for launches and small boats and that the amount of resulting commerce would not be commensurate with the cost of improvement. He therefore reports the locality unworthy of improvement at the expense of the United States, and in this view the division engineer concurs.

5. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated October 7, 1912. Interested parties were advised of the unfavorable views of the district officer and given an opportunity to present their views. After a full consideration of all the data presented the board is of the opinion, expressed by the district officer and division engineer, that it is inadvisable for the United States to undertake the improvement of this locality at the present time.

6. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Brule Harbor, Wis., in the manner apparently desired by the interests concerned as described in the reports herewith is not deemed advisable at the present time.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 7, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This is a report on survey of Brule Harbor, Wis. Phypsical and commercial conditions are fully described in report on preliminary examination. The district officer presents a plan of improvement at an estimated first cost of $16,500 and $1,500 annually for maintenance. It involves a simple form of jetty construction extending out to the 8-foot contour in the lake, the jetties to be placed 150 feet apart, and the dredging of a channel through the bar 6 feet deep at low water and 75 feet wide, and a channel of the same depth and 50 feet wide for a short distance within the harbor.

3. The district officer states that a depth of 6 feet would provide for any of the gasoline launches that are used on the lake and would also admit some of the smallest tugs. He reports that as there will be no commerce to speak of and the harbor will be used chiefly as a harbor of refuge for launches and small boats, it is his opinion the locality is unworthy of improvement. In this view the division engineer concurs.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting statements and arguments to the board. One communication has been received and given consideration.

5. There is practically no commerce at the present time, and but little can reasonably be expected in the near future. The harbor would be used chiefly for shelter by gasoline launches, mainly too small to carry on any commerce of importance. In the opinion of the board the cost of improvement is out of reasonable proportion to the benefits to be expected, and therefore it believes it is inadvisable for the United States to undertake the work.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be coordinated with the project proposed in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of Board

PRELIMINARY EXAMINATION OF BRULE HARBOR, WIS.

ENGINEER OFFICE, UNITED STATES ARMY,
Duluth, Minn., January 26, 1912.

SIR: 1. In compliance with department letter of April 7, 1911, I have the honor to submit the following report upon a preliminary examination of Brule Harbor, Wis. It is my opinion, for reasons to be given, that the place is worthy of improvement by the United States to the extent of making a survey.

2. *Description.*—Brule Harbor is on the south shore of Lake Superior, 25 miles from Duluth, at the mouth of Brule River, which may be described as one of the larger of the small tributaries of Lake Superior. The river is not navigable except for the floating of logs. Just at its mouth there is a short stretch having sufficient depth and width to accommodate launches and small tugs. This stretch constitutes the harbor referred to. The mouth is obstructed by the usual sand bar, which almost completely blocks the entrance. The relative position of Brule River with respect to other ports and the general navigation of the lake is well shown on Lake Survey Coast Chart No. 6.

3. There is no town at Brule Harbor, only two or three residences in the immediate vicinity, and the surrounding country is sparsely settled. There is no railroad nearer to Brule Harbor than 15 miles.

4. *Former improvements.*—In the years 1893 to 1897 the Brule River Improvement Co., which was engaged in driving, sluicing, and rafting logs, improved the entrance to this river by closing the original outlet with a dam and cutting a new channel across the sand bar and building a timber crib revetment on each side of the cut so as to give a protected channel about 60 feet in width. For some years the current of the river maintained a depth of 6 or 7 feet which enabled tugs to enter. In the meantime the company completed its logging operations. By the year 1902 the beach to the east of the river had advanced so as to form a bar across the entrance, and by the year 1907 the channel had become so filled up that less than 3 feet of water was available. A small sawmill was built in 1906 by Martinsen Bros. at a cost of $10,000, but in the panic of 1907 the company failed, and the mill was abandoned and dismantled. Martinsen Bros. did some dredging to open the channel, once hiring a clamshell at a cost of $323, and at another time deepening it with their tug wheel. Since the year 1906 no attempts have been made to maintain a channel.

5. *Possible improvements.*—The physical features of this locality are such that a harbor could be constructed within the mouth of the river by the construction of parallel jetties to confine the river discharge and exclude the drifting sand and by the dredging of the river within the entrance. There is a stretch of low ground adjoining the river on the west which probably might be dredged out for a basin.

6. *Terminal facilities.*—The land in the vicinity of the river is owned by private individuals. There are no public docks or wharves, and no wharves of any kind worth mentioning. There is reason to believe that the owners of the adjacent land would be ready to grant rights and privileges necessary for the transaction of commerce, or would sell upon reasonable terms to public authorities or to the Government portions of the harbor front required.

7. The question of development and utilization of water power does not enter into the problem at this harbor.

8. *Commerce, present and prospective.*—There is no commerce transacted at this harbor at the present time. No boats are calling there, although earlier in the season a gasoline launch carrying

freight and passengers made regular trips from Duluth. Regarding prospective commerce attention is invited to the communications which have been received in response to my circular letter of April 26, 1911, abstracts of which are appended hereto. From these communications and from other sources I find that the forest products are practically exhausted and not much remaining except cordwood, and that the agricultural products will form the entire basis for future commerce. It is claimed that the construction of a good harbor would result in a great development of the lands for farming purposes, and that a large amount of farm produce would be shipped by water.

9. *Harbor of refuge.*—It is believed by some that a harbor of refuge is needed at this place. Brule Harbor lies between Duluth Superior and Port Wing, the distance from Superior Entry to Port Wing being 31 miles, not a long distance. Only gasoline launches and small tugs would be likely to seek shelter at Brule. Of course, a harbor at Brule would be a convenience for such boats but their value and importance are not sufficient to justify a large outlay for their protection.

10. *Recommendation.*—The commerce to be benefited does not exist and the commerce which might be developed at Brule Harbor would not be very large. These are facts adverse to improvement, but on the other hand it appears that the harbor has been used by small boats in the past and was a navigable waterway of benefit to the surrounding country, and that this harbor has been closed by the operation of natural forces so that it is no longer available. This being the case it would seem that if former conditions could be restored at reasonable expense the work ought to be undertaken by the United States. It may, of course, happen that the cost of restoring the harbor would be out of proportion to the benefits to be derived. This point can only be determined by making a survey. Careful examination shows that an adequate survey could be made for about $500, and it is my opinion that the place is worthy of improvement by the United States to the extent of making a survey upon which the cost of a definite project could be based.

If a harbor existed at Brule River it would be used to a certain extent as a harbor of refuge by small boats. This use of the harbor would, of itself, not be sufficient to justify an improvement, but is certainly an added reason in favor of the work.

Respectfully submitted.

FRANCIS R. SHUNK,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF THE DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., February 8, 1912.

1. Respectfully forwarded to the Chief of Engineers, concurring in the statement of the district officer that there is no commerce existing at Brule Harbor to be benefited and that the commerce which might be developed would not be large. It appears from the peti-

tion accompanying the report that the improvement is particularly desired for small motor boats and the district officer recommends a survey to determine whether at small expense the harbor could be improved so as to be utilized by this class of vessels.

2. The use of motor boats as freight carriers on the Great Lakes is very limited at the present time, and I am of the opinion that Lake Superior is too treacherous a body of water for the Government to encourage its use by pleasure craft of this type.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, March 5, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. Brule Harbor is situated about 25 miles from Duluth, on the south shore of Lake Superior, at the mouth of Brule River. This river is not navigable except for the floating of logs, but at its mouth is a short stretch having sufficient depth to accommodate launches and small tugs. This constitutes the harbor. There is no town at the harbor, and but few residences in the immediate vicinity, the surrounding country being sparsely settled.

3. There is little commerce at the harbor at the present time. It appears that the forest products of the surrounding territory are practically exhausted, and that agricultural products will form the basis of future commerce. Local interests believe that the construction of a good harbor would result in a great development of the lands for farming purposes, and that a large amount of farm produce would be shipped by water. The district officer reports that the physical features of the locality are such that a harbor could be constructed within the mouth of the river by building parallel jetties to confine the river discharge, and by dredging the river within the entrance.

4. It appears that the harbor would be utilized by small motor boats and tugs, and that it has a potential value to these as a harbor of refuge. The district officer states that it was so used in the past, but that it has been closed by the operation of natural forces, and that original conditions ought to be restored if this can be done at reasonable expense. He recommends a survey to determine the cost. For reasons given the division engineer does not concur.

5. At a hearing before the board on January 2, it was stated by Hon. I. L. Lenroot, M. C., that the improvement desired was for the purpose of accommodating small craft, and that a very inexpensive improvement would serve present needs. From the information now before the board, it believes that the advisability of the improvement desired is dependent upon its cost, and therefore it recommends that a survey and estimate be authorized.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, March 9, 1912.

1. Respectfully submitted to the Secretary of War.
2. This is a report on preliminary examination of Brule Harbor, Wis., authorized by the river and harbor act of February 27, 1911.
3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *March 12, 1912.*

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

ABSTRACT OF LETTERS RECEIVED.

[In reply to circular letter of Maj. Francis R. Shunk, Corps of Engineers, dated Apr. 26, 1911, requesting opinions on the question of improvement Brule Harbor, Wis.]

No. 1.

[T. N. Okerstrom, dealer in pine and hardwood lumber, Port Wing, Wis.]

PORT WING, WIS., *April 29, 1911.*

* * * * * * *

I wish to say for the welfare of the new settlements in that locality and for the settling up of those rich lands in that locality, it would be to their great benefit to have a harbor where small craft could get up to a dock, as well as smaller freight and passenger boats could land and get into shelter in stormy weather.

The timber through that entire locality has been practically all cut, and the main thing now at that point is to make it possible for people to ship their products to market by having a harbor at the mouth of Brule River.

I therefore recommend, if the Government has money to spend for such harbor improvements, that a harbor be built there.

No. 2.

[Loveland & Co., by W. A. Loveland.]

MINNEAPOLIS, MINN., *May 9, 1911.*

* * * * * * *

I will answer your questions. (*a*) Present business of the locality is principally potato, chicken, eggs, hay, cattle, and butter raising. (*b*) The channel of the river, if protected by a pier extending into the lake to prevent the filling of the mouth of the Brule River with sand being washed in by the lake, would admit the small craft to enter the Brule Harbor. In order that the larger boats and barges may enter the mouth, the river would have to be widened and some dredging done to permit the turning of the larger boats in the harbor. (*c*) Prospects for the rapid settlement and improvement by the farmer, cattle raiser, and commercial fruit culturist were never better. All it needs is the Brule Harbor opened to navigation to develop this country near the Brule Harbor. (*d*) Potatoes, hay, cattle, sheep, apples, butter, eggs, strawberries, and other products of the farmer will be shipped by water from the Brule Harbor to many points on the Great Lakes. No doubt a sawmill, box factory, and probably other industries will be established at the Brule when it is learned that shipping facilities can be had.

I am the president and a heavy stockholder in the Realty Bond Co., of Washburn, Wis., and the Northwestern Bond Co., of Minneapolis, who own about 15,000 acres of land near the lake shore from the town of Bayfield to the Brule River. There is no railroad nearer than 15 miles from the Brule Harbor. There are many farmers near the Brule, and with a harbor for the freight and passenger boats the country near the Brule would fast settle up. It is impossible for boats to put off or take on passengers or freight when there is a heavy sea. In quiet weather freight and passengers are landed in rowboats. Many times I have stood on the bank of the Brule and undertook to flag a boat that I could go to Superior or Ashland, but owing to the poor harbor and no landing they would not stop.

Last season potatoes were raised at the Brule for the Duluth market. Arrangements were made with the owner of a boat to carry them to Duluth. The potatoes were delivered and stored in the small warehouse at the mouth of the Brule, but owing to the bad weather and poor harbor the potatoes were not marketed, and are now buried in the ground. Too far to haul to a railroad. and with no lake transportation the farmer will no doubt lose his crop.

Not many years ago a party undertook to raise strawberries in that neighborhood for the Duluth markets. He found no trouble in raising the berries, but on account of the condition of the Brule Harbor he could not get them to market. This party finally abandoned his strawberry bed and left the country. Many near the Brule have undertaken the butter and egg business, but owing to the long distance to railroad and no harbor or landing at the Brule that boats could reach on their regular trips this business was dropped. A sawmill was forced to close down at the mouth of the Brule about two years ago. The poor shipping facilities were the principal reason. They were forced to load the lumber on small barges and tow them out to the larger boat, which made the expense of shipment to market too expensive.

If the Brule Harbor was improved so that the boats could land, the country tributary to the Brule River would soon settle up with a prosperous farming community. There are many small boats that ply the Lake Superior shore from Duluth to Ashland, and there is no harbor for them to make in case of storm or accident between Allouez Bay and Port Wing. In my opinion, a good, big harbor could be made at the mouth of the Brule River with but comparatively little expense. The Brule River enters Lake Superior through a channel about 75 feet wide; back of the lake shore about 100 feet the river spreads out covering about 600 feet square between high banks, on either side the water covering a part of this flat deep enough to run a small launch over. It seems to me that the United States Government would have two good reasons why the Brule Harbor should be improved—first, as protection to the craft in time of distress; second, for the interests and development of commerce and of that country. No doubt that country has been held back for the past 10 years on account of there being no lake transportation.

No. 3.

[L. F. Baxter.]

Brule, Wis., *May 18, 1911.*

* * * * * * *

A. The present business is farming. The principal crops raised are hay and potatoes; cattle, hogs, sheep by way of stock; and hens, ducks, turkeys, and geese in fowl line. There is in the immediate vicinity and adjacent thereto a large amount of cordwood, cedar posts, and poles and tamarack spile timber box factory stock, which would all be shipped by water if we had any facilities for shipping the same. The only way we have now is to row out in a small boat, which can not be done only in calm weather.

B. The kind of improvement we had in mind was the building of a pier out into deep water that is deep enough so the sand would not fill around it. Of course we did not expect a harbor for large boats, but for the smaller line of crafts. The building of the pier and the dredging of a short distance of the river would, in my opinion, be all that was wanted at the present.

C. As to the amount of prospective business, I think any boat doing business on the south shore would find this one of her best ports. As I stated before, there are lots of timber products to be handled, besides the farming would more than treble; in fact, at the present time, there is no incentive for the improvement of this part of the country, because we can not get our produce to market. We are 16 miles from a railroad station, and when we get there there is no market.

D. The benefits to commerce will be many. First, the smaller boats that ply this shore have no port in case of bad weather until they get to Port Wing. There are good fishing grounds off the mouth, but they are too far away from any shelter for fishermen. There is just one more point I wish to call your attention to, and that is the facilities for recreation that it would give the people of Duluth and Superior. It is only a short distance from those cities and we have as nice a place for the purpose as can be found on the south shore. The fishing is good, there is a fine place for camping, and those who would like to purchase land for summer cottages will find it cheap. Now, it seems to me as though this great United States could afford to spend the little amount of money when the benefits that will be realized will be so great to all the surrounding country. Hope you will see your way clear to sending a favorable report in behalf of the people of this locality.

No. 4.

[Harvey Bros., by John C. Harvey.]

MARTINSEN, WIS., *May 22, 1911.*

* * * * * * *

Will say that the undertaking is a capital one. It would greatly benefit this locality, as we have no outlet for this part of the country, and would aid to settle this part at once. We have the best area of land in the United Kingdom and this piece of work would get us all out for marketing our product. As it is to-day we have from 9 to 16 miles inland to go for our trading, and after we do get there we have to pay horrible prices for what we buy, and get but very little for what we have to sell. If we had a harbor at the mouth of the river it would give a base for trading at the head of the lakes for about 50 farmers that would amount to about $5,000 for import and $5,000 for export, also for sporting fish and same would amount to few hundred more for the present, and in the course of one year after the work will be completed would double the amount, as this land would soon be all settled and would need a harbor to accommodate from 10 to 12 small launches and a couple of small freight boats to carry the imports and exports. Would also give accommodation for getting our mail. As it stands now we are isolated from all benefits of our Government.

This country is not equaled for raising strawberries and we can not deal in them. The reason why is we have no way to ship them.

No. 5.

[H. H. Martinsen, captain of gasoline launch *Elvina*, sailing on south shore of Lake Superior.]

DULUTH, MINN., *May 28, 1911.*

* * * * * * *

(*a*) This is a well-settled, well-cultivated farming country which is doing a very flourishing business in the truck-farming line generally. There are thousands of acres in this vicinity laying idle simply because there is no way of getting the produce to market, and by the improvement of this harbor, or making a harbor where now there is no chance of getting in at all, this rich country would be brought under cultivation to the benefit of the settlers as well as the nearer cities. There is a good harbor over the sand bar for small boats, but is useless now on account of the bar which has formed across the end of the present pier.

(*b*) It is desired to have both piers extended across the bar. The east pier to be considerably longer than the west one.

(*c*) While there can now be no shipping from this port, by erecting the piers there will be a considerable volume of business which will be materially increased as the territory farther back from the lake is opened up. This can not be worked at the present time, as there is no way of shipping the produce.

(*d*) The smaller boats, both freight and fishers, will be greatly aided by the improvement of this harbor, as there is plently of business there, but no way to get in to get it. I believe this has the making of quite an important small port on the south shore. Then, too, this would be a harbor of refuge between Port Wing and Superior, of which there is none at the present time, though badly needed.

No. 6.

[M. H. Martinsen, postmaster.]

MARTINSEN, WIS., *May 26, 1911.*

* * * * * * *

There are several reasons why the proposed improvement of the Brule River Harbor should be considered.

First. As a harbor of refuge during storms for boats of all classes plying the south shore, as there is no place where a small boat can get in for protection between Superior and Port Wing when caught in a storm.

Second. To promote the development of thousands of acres of the finest fruit and grazing lands in the Northwest tributary to the Brule River, which is now undeveloped on account of the impossibility of getting commodities in and out. The time is coming when the Brule River district will be the garden spot of the head of the lakes, and being only 23 miles from Duluth and 20 miles from the Superior Ship Canal it will be one of the main sources of supplying the vegetable, fruit, poultry, butter, and egg trade of the head of the lake, and the country and climate being naturally adapted to fruit and vegetable garden truck the country would develop and settle up with 10, 20, and 40 acre tracts devoted to truck raising. It is 16 miles from the mouth of Brule River by road to the railroad station at Brule, Wis., making it impossible to transport crops of any kind by wagon to market. Strawberry growing will be one of the main crops of the Brule River district.

Third. For a number of years the Brule River has been noted for its beauty and its excellent trout fishing, and people of means have been buying small tracts of land along the banks where they have built summer homes on the river front, where they can spend their summer months fishing and boating on the river. By improving the harbor there would be a rush for land along the river front by this class of people, as that would give them an opportunity of coming and going in gasoline launches.

Fourth. By improving the harbor the Brule River would become a very important fishing port.

Fifth. Motor boat *Elvina*, which is now operating from Duluth, Minn., to Port Wing and Cornucopia, Wis., carrying freight and passengers along the south shore, is owned and operated by E. L. Martinsen and built by him at Martinsen, Wis., in 1910. The *Elvina* hails from Brule as her home port, but she has never entered the Brule Harbor because it is impossible for her to get in the harbor. When the *Elvina* has passengers for Brule it is necessary to put out a boat and row them ashore and any freight taken aboard has to be taken out in rowboats, and if there is any wind at all it is impossible to handle freight in rowboats.

The promoters of the proposed improvements of the Brule River Harbor do not ask for any extensive improvements. I have had considerable experience with the Brule River, and as a member of the firm of Martinsen Bros. operated a sawmill at Brule River, and in order to get lumber scows out of the river we were compelled to do some dredging. We dredged several days and had water enough for our purpose for the time being, but it filled in a sand bar at the outer end of piers and across the river mouth.

As a result of my experience I would suggest that one good substantial pier be constructed on each side of the river extending out into Lake Superior into deep water, and I believe that after a good freshet that would wash out the sand bar across river at the outer end of old pier, that the natural water of the river would maintain a depth sufficient to allow boats of 6 or 7 feet draft to enter. If dredging would be necessary, it could be provided for later. The main object now being the extension of east pier to prevent the washings of sand along the beach and around the end of old pier and forming a sand bar across river mouth.

Thinking that a general knowledge of the conditions past and present may be of benefit to you, I have made a rough diagram [1] showing the conditions as I have found them. This sketch is made from memory, so that measurements given are as near as I can judge them.

When I came to the Brule River country in 1890 the Brule River channel was as indicated by letter A in diagram attached hereto.[1] In the year 1892 Capt. B. Daherty, of Ashland, Wis., organized the Brule River Improvement Co. for the purpose of driving, sluicing, and rafting logs on the Brule River. Capt. Daherty constructed two dams across the river for raising water for floating logs, one dam being about one-half mile from the mouth of the river and the other dam about 12 miles up the river. In the spring of 1893 Capt. Daherty dug a new channel at the mouth of the river, changing the direction of the river from a westerly direction, as shown at A, to a northerly direction, as indicated at B. He constructed a brush dam across original channel. At the time he constructed one crib pier on each side of the river to maintain the channel as shown at CC. The original shore line or beach of Lake Superior is indicated by letters DD.

Before the channel was changed it was impossible to enter the river with anything but a rowboat on account of the river flowing along the shore of Lake Superior. In the winter of 1896 and 1897 Capt. Daherty built an extension to the crib piers, extending east pier E about 150 feet and west pier E about 100 feet. By the extension of pier EE into deep water the washing of sand along the beach D by northeast storms was shut off which had now filled into the outside end of east pier C as indicated by shore line F and formed a sand bar across between the outer ends of piers CC. By the extension of the piers EE a deep channel was created and boats of 6 or 7 feet draft had no difficulty in entering the harbor. I had seen quite large tugs tied up inside the harbor in 1898. About in the year 1902 the beach F had been extended to the outer end of east pier E as indicated by shore line G, and again began to form a sand bar across the mouth of the river at the outer ends of pier EE.

From the year 1903 to 1906 we had a little steam tugboat *Nellie M*, drawing about 5 feet of water, which we used for towing logs for our sawmill. During 1903 and 1904 we had no difficulty in making the harbor with this boat, but in 1905 we had to dig a channel with the propeller in order to get in and out, and in 1906 we had to sell the tugboat because we could not get it into the harbor, and we built a gasoline boat drawing about 3 feet of water to use in its place, and in 1907 the river had barred up so that we could not get into the harbor with that.

The cause of the formation of the sand bar H across the mouth of the river is the washings of sand along and in front of beach G by northeast storms on Lake Superior carrying sand along the water's edge from the sand beach east of the river, as indicated by arrow at I, and when the sand comes in contact with the current of the river J, which is overcome by the waves and current of the northeast storms indicated by arrow at K. The current of the river is then working against the waves of the northeast storms and as a consequence it piles up a sand bar between the current of the river and the swells of the lake and causes the current of the river to take a westerly course and follow the shore westerly at L.

It is therefore the washing of sand along the shore by northeast storms that bars up the entrance to the harbor, and in order to remedy this it will be necessary to build an extension of the piers into deep water.

P. S.—The recent heavy rains we had raised the Brule River so that it washed away a portion of sand bar across mouth of river for the time being.

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[1] Omitted.

No. 7.

[Mr. James Bardon, real estate.]

SUPERIOR, WIS., *May 29, 1911.*

* * * * * * *

INFORMATION AND OPINIONS ABOUT BRULE HARBOR AND CORNUCOPIA HARBOR.

Each of these harbors is at the mouth of a river emptying into Lake Superior, and some improvement thereon has been made by citizens, settlers, farmers, sawmill men, and lumbermen using them. With the exception of Port Wing, they afford about the only shelter for small craft in the 60 miles of lake navigation between Superior and Bayfield. Along this 60 miles the land on the south shore of Lake Superior is a gently undulating slope, not stony, possessing a strong, rich soil well drained by numerous streams, excellent for agriculture, horticulture, and stock raising; and being without a railroad the inhabitants are largely dependent upon lake navigation. It may be said here that safe harbors can be constructed along this shore at the mouths of the Amnicon, Middle, Poplar, Brule, Iron, Cranberry, Sand, and Raspberry Rivers, and other streams, by dredging channels and building piers to confine the current, and in some cases by breakwaters in the lake, quite as easily and cheaply as has been done at the mouths of the rivers along the west shore of Lake Michigan from Chicago and Milwaukee northward, and it is not straining the imagination to predict that the time will arrive, within a few years, when the business and traffic along the south shore of Lake Superior will surpass that along the west shore of Lake Michigan to-day.

The General Government can wisely at this time, by comparatively small expenditure, so improve the harbors of Brule and Cornucopia especially, and others along the shore as needed, as to afford access and shelter at least to light-draft vessels, such as small schooners, flat-bottomed freight barges, naphtha and electric launches, fishing crafts, rowboats, canoes, etc., planning the work in such a way that deepening and enlarging may be made in the future whenever warranted by growth and demands.

That the small water craft is quite as deserving of aid and protection as is the largest lake or ocean vessels is self-apparent. There is no good reason why the Government should not look after the needs of one as well as those of the other. In fact, the weight of argument is on the side of the small-craft harbor, for besides accommodating a large and neglected class of navigators to-day, every such work undertaken is the initial step in the construction of a harbor for the largest boats.

No. 8.

[C. E. Wales, real estate, capitalist.]

MINNEAPOLIS, MINN., *May 29, 1911.*

* * * * * * *

Referring to your communication of April 28, in re improvement of Brule Harbor, I do not know what the nature of the improvements asked for is, but it is my opinion that the improvement of this harbor would be a great benefit to commerce and aid greatly in the development of the territory tributary to Brule Harbor. After leaving the Superior Entry I do not think that there is a point nearer than Port Wing where a boat can get shelter. There is a large territory along the south shore which is not accessible by either rail or water at the present time. The territory is being quite repidly developed and the people are badly in need of some means of communication with the cities of Duluth and Superior to give them a market for their products. Proper harbor improvements would afford this territory with facilities of reaching Duluth and Superior and other lake ports, and it is my opinion that the improvement of this harbor would be very beneficial to commerce, in that it would afford boats shelter in case of storm and would aid greatly in developing the territory tributary to Brule Harbor.

REPORT OF SURVEY OF BRULE HARBOR, WIS.

ENGINEER OFFICE, UNITED STATES ARMY,
Duluth, Minn., August 3, 1912.

SIR: 1. In compliance with department letter of March 13, 1912, I have the honor to submit a report on a survey of Brule Harbor, Wis., with a plan and estimate of cost of improvement and maintenance.

2. It appears from a careful estimate that the cost of this work will be $16,500, supposing that no rock is met, which supposition is in accordance with local indications. As there will be no commerce to speak of to be benefited and the harbor will be used chiefly as a harbor of refuge for launches and small boats, it is my opinion that the cost of the improvement would be out of proportion to any benefits to be expected; and I therefore recommend that this locality is not worthy of improvement by the United States at the present time.

3. *Survey.*—A survey of the locality of the mouth of the river has been made under my direction by Charles Carisch, junior engineer, draftsman, and a tracing of the map accompanies this report.

4. The river within the entrance has a width of about 100 to 150 feet and a depth of 2 to 4 feet for a distance of about half a mile, with a discharge of 519 feet per second at time of survey, May 29, 1912. No very definite high-water data were obtainable, but the appearance of the shores and statements of residents indicated no excessive flood discharge.

5. At the mouth are the remains of former private improvements made by a lumber company and mentioned in my preliminary report of January 26, 1912. These consist of log crib revetments 55 to 64 feet apart, the longer one on the east side 180 feet in length and the west one 130 feet. Between these cribs there is a channel 6 feet deep maintained by the scouring action of the current. Outside these cribs a bar has formed in the lake by the movement of sand from the east caused by wave action during northeasterly storms. This bar has about 2 feet over its crest, with a channel of slightly greater depth to the west of it.

6. *Plan of construction.*—It is proposed, in case of improvement, to build two parallel jetties from the mouth of the river out across the bar to the 8-foot depth of water, placed 150 feet apart, as shown on the accompanying map, the east jetty to be an extension of the present timber crib, the west jetty to extend out from the shore also to the 8-foot depth. With the present condition of the bar the length of the east jetty would be 500 feet and west jetty 680 feet. The west jetty is to extend into the shore a short distance to prevent waves in a northwest storm from cutting around it.

7. The form of construction of each jetty is to be a single line of sheet piling, supported by main piles, timber wales, and fenders secured by machine bolts and other fastenings as required. At the outer end additional piles and timber would form a pierhead, to give the necessary strength to withstand the attacks of waves and of ice fields. Sheet piling for the outer portion, where the depth of water is more than about 5 feet, to be of solid timbers of size about 12 by 12 inches by 20 feet, with tongues and grooves spiked on to make

them sand tight; and for the inner portion, in 5 feet or less to be the Wakefield type. The driving of main and sheet be done with the aid of a water jet. The penetration of is to be sufficient to insure against lifting by ice. The method of construction should be subject to modification to suit varying conditions that may arise.

8. *Dredging.*—It is proposed to dredge to give a chann deep at low water and 75 feet wide through the bar from t depth in the lake between the piers and leading up to th 6-foot channel between the old cribs, and to dredge for a of 200 feet from the entrance up the river to a depth of 6 width of 50 feet where it leaves the channel between the and widening out to 100 feet to give boats a chance to turn. dredging up the river to be done by local private interests be desired.

9. By referring to the map it will be seen that the 6-foot the lake would be reached at a distance of 200 feet from the crib, while the proposed jetties extend to the 8-foot depth, 300 feet farther. This is to insure a longer period of immuni the advance of the shore line lakeward on the east side of trance, which is sure to occur after the building of the jett to the arrest of the moving sand from the east, and which eventually creep around the end of the jetty and form a ba the entrance. Some accumulation of sand may also be exp occur on the west side of the entrance at a slower rate, but greater body of the present sand bar lies on the west side entrance it is thought best to extend the west jetty to an equ tance with the east jetty.

10. The depth of 6 feet would provide for any of the g launches that are used on this lake, with a clearance of 2 feet under the keel, and would also admit some of the smallest tugs

11. The main purpose of these jetties is protective rather t cause scouring of the channel, and they have been placed 1 apart in the plan with a view to provide safety in maki entrance during storms with cross winds and seas and to per an enlargement of the channel at a future time if desired. may be expected more or less filling in of the channel from deposits only partially carried away by the currents and some of the dredged channel through the bar by wave action betwe piers, so that redredging would be required probably as of once in two years to remove shoals.

12. *Estimate of cost.*

Jetties:
600 linear feet of outer section, with solid-timber sheet piles, at $12
580 linear feet of inner section, at $6.50
Additional piles and timber at pierheads

Dredging, 7,000 yards, at 25 cents
Administration and contingencies, 25 per cent

Total

13. It is assumed that no rock will be encountered to preve driving of piles. No borings were made. Appearances ind

that the material is sand, and evidence is at hand that piles have been driven inside the harbor in former years for sheer booms and just outside the entrance for the purpose of keeping rafts off the beach, all these piles subject to heavy strains.

14. The timber estimated is hemlock, or coast fir if furnished by the Government and transportation paid at Government rates. Dredging can probably best be done with a sand pump.

15. *Maintenance.*—For the removal of shoals and for repairs an annual cost of $1,000 is estimated; for depreciation, $500; total, $1,500.

Respectfully submitted:

FRANCIS R. SHUNK,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[For report of the Board of Engineers for Rivers and Harbors on survey see page 3.]

[First indorsement.]

OFFICE OF DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., August 7, 1912.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendation of the district officer that this locality is not worthy of improvement by the United States at the present time.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

SYNOPSIS OF STATEMENT BY HON. I. L. LENROOT, MADE BEFORE THE BOARD OF HARBOR ENGINEERS WITH REFERENCE TO BRULE HARBOR, ON LAKE SUPERIOR.

In the last rivers and harbors bill at my request a provision was inserted providing for the survey of Brule Harbor with a view to its improvement. Such survey has been made, and the engineer in charge has reported against the improvement upon the ground that there was not sufficient commerce originating at this point to justify the improvement. This survey and report were made upon the basis of a considerable improvement involving the deepening of the harbor inside the bar and affording a harbor of refuge and involving the creation of a harbor sufficient for the large lake vessels plying upon the Great Lakes.

This harbor is located some 30 miles from Duluth and Superior at the head of the Lakes. Upon the report of the engineer being made the owners of motor boats in Duluth and Superior, of which there are several hundred, became interested in this matter, and in cooperation with the farmers settled about the mouth of Brule River, of which there are some 50 or 60, requested a consideration of this matter by your board with a view to merely a minor improvement sufficient to afford entrance to the Brule River of motor boats of not more than 5 or 6 feet draft.

For more than 20 years the mouth of this river was a good harbor for boats and tugs of such a draft. The country round about this point was originally a heavily timbered country. Hundreds of millions of feet of logs were floated down the Brule River and rafted and either sawed at a mill at the mouth of the river or towed by tugs to the mills at Duluth, Superior, Ashland, and Bayfield. The lumber companies operating there during that period kept the mouth of the Brule River open by the building at a comparatively small expense of cribs reaching a short distance into the lake. The prevailing winds are from the northeast, and the necessity for such cribs arises from the fact that the northeast winds meeting the current from the river at the narrow entrance form a sand bar across the mouth. It was found that by placing these cribs a very short distance into the lake the sand bar was not formed, and the current of the river, which is quite strong, was sufficient to keep the mouth of the river open into the lake.

Timber operations ceased some years ago and the country commenced to be settled by farmers, of which, as I have said, there are now some 50 or 60 in the immediate vicinity. So long as these cribs stood so that boats of small draft could go into the river boats plying along the south shore made regular stops at this point, enabling the farmers to ship their produce to the markets at Duluth and Superior. Some two or three years ago, as I am informed, a storm swept away the crib which had been erected by the lumber companies, and since that time a bar has been formed across the mouth of the river, preventing boats from entering the river except occasionally after a period of good weather and when the current of the river has been sufficient to sweep away the bar and afford means of ingress.

The special interest of the owners of motor boats in the improvement lies in the fact that this is the only possible refuge on the south shore of Lake Superior between Duluth and Superior and Port Wing. Brule Harbor lies about 30 miles east of Duluth and Superior and Port Wing about 45 miles. This stretch of 45 miles upon Lake Superior makes it very dangerous for the owners of these boats to ply upon the lake. Lake Superior is subject to frequent storms coming from the northeast, and they come up very suddenly A small motor boat with a speed of 10 or 12 miles an hour, unless it can find refuge within an hour after a storm arises, is in danger of wreck. If these boats could get refuge in Brule Harbor, the south shore would be regarded as entirely safe for navigation by these craft from the head of Lake Superior to the Apostle Islands.

Again referring to the farmers settled about this point, I will say that the nearest railroad is some 16 miles distant; that between that railroad and the mouth of the river there is a considerable range of hills which makes it very difficult for the farmers to haul loads of any size to the railroad station.

Brule River is perhaps the most noted trout stream in the United States, and while perhaps any facilities for its use for such purposes might not justify an expenditure of Government money I will say that if these mottor boats could get inside the river there would be scarcely a day from May until September when there would not be from a dozen to 20 motor boats using this harbor for such purposes.

It is believed that a very moderate expenditure of money, not exceeding $5,000, would be sufficient to restore the mouth of the river in the condition that it was for so many years when kept open by the lumber companies, and in view of the needs of a harbor of refuge for the owners of motor boats and the facilities that would be afforded to farmers for marketing their produce I believe that this small expenditure would be eminently justifiable.

O

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1130.

ARCHERS HOPE RIVER, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF ARCHERS HOPE RIVER, VA., WITH A VIEW TO SECURING INCREASED DEPTH FROM ITS MOUTH TO WILLIAMSBURG.

DECEMBER 11, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 10, 1912.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated October 17, 1912, together with copies of reports from Lieut. Col. W. C. Langfitt, Corps of Engineers, dated October 29, 1910, and October 21, 1911, on preliminary examination and survey, respectively, of Archers Hope River, Va., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 17, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on examination and survey of Archers Hope River, Va.

1. I have the honor to submit herewith, for transmission to Congress, reports dated October 29, 1910, and October 21, 1911, by Lieut. Col. W. C. Langfitt, Corps of Engineers, on preliminary examination and survey, respectively, of Archers Hope River, Va., with a view to

securing increased depth from its mouth to Williamsburg, authorized by the river and harbor act approved June 25, 1910.

2. The United States has never improved this river above its mouth, but several years ago a narrow channel was dredged across the bar at the mouth between the 6-foot curve in James River and the river's mouth. The improvement now desired is a channel 8 feet deep at mean low water to permit canal barges to be loaded to full capacity at the landings in the river and pass out uninterrupted at high tide.

3. The district officer presents two main projects which he calls No. 1 and No. 2, requiring 6 and 8 feet depths, respectively, and both following the main channel and present mouth. He also presents modified projects 1a and 2a, following the main channel, the Thoroughfare, and the new mouth; and projects 1b and 2b following the main channel and the new mouth; the estimates for the above projects vary in cost from $49,970 for project No. 1, to $100,636 for project No. 2a; $1,000 annually is allowed for maintenance for any of the projects. The district officer favors project No. 2, which provides for a depth of 8 feet and a bottom width of 60 feet and a turning basin about 300 feet long by 150 to 200 feet wide at Williamsburg Landing, and the protection of the entrance to the channel by parallel bulkheads, at an estimated total cost of $72,038, if improvement is undertaken; but for reasons given in his report he is of opinion that the river would not be used extensively and that the cost of the work is excessive when compared with probable resulting benefits. The division engineer concurs in this view.

4. These reports have been referred as required by law to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 19, 1911, concurring in the opinion expressed by the district officer and division engineer. Interested parties were notified of the unfavorable character of the report, and only one communication was received in response thereto, and in that the writer states that while he is interested in the river he thinks the traffic is insufficient to justify the Government in making the improvement.

5. After due consideration of the above-mentioned reports, I concur, in general, with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Archers Hope River, from its mouth to Williamsburg, Va., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

Edw. Burr,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, December 19, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

Having made a survey of this river, the district officer presents herein several estimates for the improvement of the river, involving dredged channels protected at the mouth by bulkheads, as follows:

Project 1: 6-foot depth.	By main channel and present mouth	$49,970
Project 1*a*: 6-foot depth.	By main channel, thoroughfare, and new mouth	70,876
Project 1*b*: 6-foot depth.	By main channel and new mouth	56,356
Project 2: 8-foot depth.	By main channel and present mouth	72,038
Project 2*a*: 8-foot depth.	By main channel, thoroughfare, and new mouth	100,636
Project 2*b*: 8-foot depth.	By main channel and new mouth	74,578

All estimates are based on a bottom width of 60 feet. The cost of maintenance for any of the projects is placed at $1,000 annually.

Believing that a depth of 8 feet is the least that would effectively serve prospective commerce, the district officer favors project No. 2, estimated to cost $72,038, if improvement is undertaken, but for reasons given he is of opinion that the river would not be used extensively and that the cost of the work is excessive when compared with probable resulting benefits. In this view the division engineer concurs.

There is but little commerce on this river at present and it appears that conditions are not very favorable for any material increase. The demand for improvement is not great, as evidenced by the fact that but one communication has been received by the board in response to the district officer's notification of his unfavorable report, and in that the writer states that while he is interested in the river, he thinks the traffic is insufficient to justify the Government in making the improvement.

In view of all the facts, the board concurs in the opinion that the cost of the work is high when compared with existing and prospective commerce, and it believes it to be inadvisable for the General Government to undertake the work. There are no questions of terminal facilities, waterpower, or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

H. C. Newcomer,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF ARCHERS HOPE RIVER, VA.

United States Engineer Office,
Washington, D. C., October 29, 1910.

Sir: I have the honor to submit the following report upon the preliminary examination of Archers Hope River, Va., made in compliance with department letter dated August 4, 1910, and in pursuance of the provisions of the river and harbor act of June 25, 1910, from section 3 of which the following is an extract: Archers Hope River, Va., with a view to securing increased depth from its mouth to Williamsburg.

Under the direction of the officer in temporary charge of this office Mr. S. H. Yonge, assistant engineer, conducted the necessary investigations, and together with Capt. Warren T. Hannum, Corps of Engineers, United States Army, attended the public hearing held at the courthouse at Williamsburg, Va., September 22, 1910, and made an inspection of the river on the same date. The public hearing was attended by about 58 individuals interested in the improvement of the river. Much of the information on which this report is based was obtained at the public hearing and by correspondence with interested parties.

The following is abstracted from Mr. Yonge's report:

DESCRIPTION.

Archers Hope River is a tributary of the estuary part of James River, Va., which it enters about 27 miles above the latter's mouth at Hampton Roads. Its watershed, about 15 square miles in extent, is situated on the southern slope of the ridge separating the James and York Rivers. Data as to the flow is not available. The river's length from Williamsburg Landing to the mouth is about 4½ miles. Its course is tortuous through a fresh water marsh, touching high grounds at several points, at which there are landings. For about one-half mile below Williamsburg landing the width of the channel is 50 or 60 feet. Below this the width increases to 100 feet and upwards. The tidal range is estimated at about 2 feet at the river's mouth and 3 feet at Williamsburg landing. For about a quarter of a mile below the landing the depth at low tide is from 2 to 4 feet. Below this reach the depth varies from about 5 to 24 feet to the river's mouth, where the depth is 2 or 3 feet. In the upper half mile of the river are two sharp bends, in which the width is about 60 feet. About a mile and a quarter above the river's mouth the channel approaches to within about one-fourth mile of James River. In this vicinity the James and Archers Hope Rivers are separated at high tide by a ridge about 50 yards wide, extending a few feet above high tide. The bed of the channel is composed of soft mud, except near the river's mouth, where it is principally sand, apparently washed in from the James during southeasterly storms. In front of the river's mouth, in James River, is a littoral bar having a width to the 9-foot depth curve of about 2,100 feet. Proceeding up the James the bar's width gradually diminishes and at the point above referred to is about 1,400 feet wide to the 9-foot curve.

PREVIOUS IMPROVEMENT.

A survey was made of the river in December, 1879, on which a project approved April 2, 1881, was based. The project provided for dredging a channel with a bottom width of 50 feet, and 6 feet deep at low water where less dimensions obtained, between James River and Williamsburg. The project also provided for excavating a turning basin at Williamsburg landing. Two appropriations of $5,000 each were made for the improvement by acts of Congress approved March 3, 1881, and August 2, 1882, respectively. Work was done under these appropriations in the spring and summer of 1882, and consisted in dredging a narrow channel across the bar between the 6-foot depth curve in James River and the river's mouth. No work was done within the river, and it was reported in the Annual Report of the Chief of Engineers for 1883, page 162, that an inner bulkhead of sand and the obstructions farther upstream must be removed before any material benefit to navigation will be secured. This channel appears to have deteriorated, and there has also been some shoaling of late years in the river near Williamsburg landing.

COMMERCE.

The area tributary to the river includes the city of Williamsburg, the oldest city in the State, and its capital from 1698 to 1778. It contains William and Mary College, next to the oldest institution of learning in the United States, also one of the State insane asylums. The city has upward of 30 stores. Its population has increased about 50 per cent in the past 30 years, and is now nearly 3,000. The population outside of the city in the area tributary to the river is estimated at 500, principally farmers. About one-third of the land is under cultivation and two-thirds timbered, principally with pine and oak The latter is gradually being cleared and improved.

There has been more or less traffic on Archers Hope River for upward of 200 years. Prior to 1882, when the Chesapeake & Ohio Railroad was completed to Williamsburg, the river was used for transporting practically all of the products of and the supplies required for the adjacent territory. In 1880 two small schooners plied regularly to Norfolk and a small steamer to Richmond from Williamsburg. Until 1900 a regular sailing packet plied between Norfolk and Williamsburg.

Considerable lumber, piling, crossties, and other forest products are shipped annually out of the river. Most of these products are either rafted or carried on lighters to James River, where they are transferred to sailing vessels. A considerable proportion of the products are shipped to other States. It is claimed by those engaged in the above traffic that the difficulty and expense of getting their products out of the river curtails the traffic, which would be greatly increased and enhanced if the river were opened.

The total value of forest products shipped out of the river in the past year is estimated at $120,000. One dealer reports that he is now filling an order for 150,000 oak crossties, to be forwarded by water to Philadelphia Another dealer states that in 1909 he shipped out of the river about 2,000,000 feet b. m. of lumber, nearly all to points outside of the State. The same shipper reports having shipped, in 1907, 5,000 piles via the river to New York City.

The value of forest products shipped by rail from Williamsburg and its vicinity in the past 12 months is estimated at upward of $50,000.

It is reported that the manufacture of brick and drain tiles by a modern plant situated on the river bank about halfway between Williamsburg and the river's mouth can not be carried on successfully on account of the unnavigable condition of the river preventing these products from being shipped by water, and that if the river were improved, drain tiles could be supplied at about one-half the present cost of tiles now brought by rail to the surrounding country from distant points.

Williamsburg merchants complain of the excessive railroad freight charges, which have been advanced on some commodities from 40 to 60 per cent in the last four years. They state that several thousand tons of coal are received by railroad each year. Of this, upward of 1,000 tons is anthracite coal, which could be supplied directly from Pennsylvania by water transportation at $1.50 per ton less than at present by rail. They also state that much greater quantities of fertilizer and agricultural lime would be used if they could be transported by water; that the extensive use of agricultural lime is now prevented, as the railroad requires it to be shipped in sacks, and that for the above reason, and on account of the high freight rates it now costs twice as much at Williamsburg as at Norfolk.

The aggregate value of all kinds of merchandise now brought to and shipped from Williamsburg is estimated at from $1,000,000 to $3,000,000. The average of 31 estimates of Williamsburg dealers is $1,800,000. The amount paid at Williamsburg in 1909 for freight received and shipped by rail is reported at $38,000, exclusive of freight prepaid, or paid at destination.

There is no possibility of the development of water power in connection with the improvement of the river, nor is it believed that the river has any terminal possibilities.

In the project prepared in 1880 for the improvement of the river two plans were considered, one being the deepening of the then existing and indirect shallow channel from water of the proposed depth in the James River to and across the bar at the mouth of the Archers Hope River, and the other, the deepening of the outer portion of the existing channel leading from the water of the proposed depth in the James River and continuing this portion of the channel by dredging in a direct line through the sand flats separating the James and Archers Hope Rivers, thus forming a cut-off. The inner end of this cut-off would have been about three-quarters of a mile along the river channel from the mouth of the river. The first plan was followed. At the time of the recent preliminary examination the locality mentioned in Mr. Yonge's report above was noted, where it appeared that a successful cut-off might be practicable and where the length of the area to be dredged would be much shorter than in the plans considered in 1880. It is noted that the $10,000 previously appropriated and expended in the improvement of the river was insufficient to complete the dredging at the mouth of the river and to construct the proposed jetty to act as a sand bar and prevent deterioration of the dredged channel. The inability to construct a jetty, due to lack of funds, has permitted the work previously accomplished to be obliterated. Any plan of improvement to be adopted will require one or more jetties properly located to maintain the depth of the dredged channel.

NATURE OF IMPROVEMENT.

The improvement required to make Archers Hope River navigable would consist in opening a channel across the littoral bar in the James River either at the mouth of the Archers Hope River or opposite some suitable point along the narrow neck of land separating the two rivers where a cut-off would be practicable including the dredging of the cut-off and the deepening of parts of the channel of the river and widening at two places where the change of direction of the channel is very sharp, and the dredging of a turning basin at Williamsburg landing. The depth desired by interested parties is 8 feet at mean low water in order to permit canal barges to be loaded to full capacity at the landings in the river and pass out uninterrupted at high tide.

It is believed that the improvement of Archers Hope River at its mouth would very materially develop the commerce of the lower portion of the river, and if the improvement should include the dredging of the upper portion of the river with the turning basin at Williamsburg landing much of the commerce of the city which is now carried by rail would be shipped by water and the commerce of the city in some commodities would be increased. The river is believed to be worthy of improvement, and it is therefore recommended that a survey be made to determine the nature and extent of the improvement which may be advisable. The estimate of the cost of making the survey of the river is $500.

For and in the absence of Lieut. Col. W. C. Langfitt, Corps of Engineers.

Very respectfully,

WARREN T. HANNUM,
Captain, Corps of Engineers.

THE CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer)).

[First indorsement.]

U. S. ENGINEER OFFICE, EASTERN DIVISION,
New York City, November 3, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views and recommendation of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 14, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

This stream is an estuary of the James River. The distance from its mouth to Williamsburg, the head of navigation, is 4½ miles. For about one-fourth of a mile below Williamsburg the available depth is 2 to 4 feet, while it is much deeper below excepting on the bar at the mouth where the depth is 2 to 3 feet. Some work of improvement was done at the bar in 1882, the results of which were not entirely satisfactory.

Two plans of improvement suggest themselves, one following the natural course of the river and crossing the wide bar at its mouth; the other by means of a cut-off about 1¼ miles above the mouth of the river, where the stream is close to the James and where the bar is not as wide as at the mouth.

The water-borne commerce of the locality is reported as having a value of $120,000, while the total commerce of Williamsburg is estimated at from $1,000,000 to $3,000,000. The present tonnage on the river is not large and it does not seem probable that it will ever be of great magnitude. An improved condition of the river would facilitate the handling of the existing commerce and would probably increase the volume.

It appears that the desired improvement by either method would require one or two jetties and dredging at considerable cost. Whether this cost would bear a just relation to the commerce and the benefits that would result from the improvement can be determined only after the amount is definitely known. The board believes the locality of sufficient importance to ascertain the cost of improvement, and it therefore concurs with the district officer and the division engineer in recommending that a survey and estimate be authorized. It appears that the cost of survey as estimated within is large.

For the board:

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 26, 1910.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Archers Hope River, Va., from its mouth up to Williamsburg, authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

WM. B. LADUE,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT, *November 28, 1910.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF ARCHERS HOPE RIVER, VA.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., October 21, 1911.

SIR: Complying with instructions from the office of the Chief of Engineers, United States Army, dated November 30, 1910, I have the honor to submit the following report on the survey of Archers Hope River, Va.

The results of the survey are embodied in the accompanying map[1] in two sheets, marked "Sheet 1" and "Sheet 2" (tracings).

The length of the river from its mouth to Williamsburg Landing is 3⅝ miles. From the point formed by the confluence of the James and Archers Hope Rivers a bar extends upstream in James River about 1,000 feet. It is approximately parallel to the left bank of the James, and forms the west bank of the channel entrance from the James to the mouth of Archers Hope River. This entrance is approximately the site of the dredging done for Archers Hope River in May and June, 1883. (See Report Chief of Engineers, 1883, Part I, pp. 841–842.) A part of the 6-foot deep channel dredged at that time still remains. About one-third of the distance dredged, however, has apparently back filled to about 4 feet.

At about 2⅝ miles below Williamsburg Landing is a marsh island formed by the bifurcation of the channel. The lesser channel is locally called the "Thoroughfare." The distance through the Thoroughfare is about 2,700 feet; by the main channel the distance between the upper and lower ends of the Thoroughfare is about 4,200 feet.

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[1] Not printed.

In the five-eighths mile stretch below Williamsburg Landing the channel depth gradually increases from about 2½ feet to 3 feet at the landing to 6 feet. Below this in the main channel to the river's mouth the depth is nowhere less than 6 feet. Within the half-mile stretch below the landing are three points of marsh at which there are abrupt changes in the channel direction, requiring removal to make the channel navigable, except for very small vessels.

A depth of 8 feet is continuous from about 1¼ miles below the landing to the river's mouth, except for a stretch of about 1,200 feet near the lower end of the Thoroughfare, where it is only a few tenths less than 8 feet, and for a stretch of about 300 feet about one-half mile below the Thoroughfare, where the depth is about 6½ feet. Excepting for a stretch of about 500 feet at its upper end, where the depth is 4 to 5 feet, and for about the same distance at its lower end, where the depth is 3 to 5 feet, the channel through the Thoroughfare is 6 to 7 feet deep.

The character of the material forming the channel bed between Williamsburg Landing and about one-fourth mile below the lower mouth of the Thoroughfare is soft mud. Below this to the river's mouth the material is sand and mud. In the 1,200-foot stretch forming the entrance to the river from the James it is sand. The bed of the channel of the James River on the left bank is hard clay overlaid with sand or mud.

The channel of Archers Hope River is more or less obstructed by sunken logs.

PROJECTS.

Two projects for improving the river are considered—one for a channel depth of 6 feet, referred to herein as "Project 1," the other for a depth of 8 feet, referred to as "Project 2." It is proposed in both projects to excavate at Williamsburg Landing a turning basin about 300 feet long by 150 to 200 feet wide and having the same depths as proposed in the projects, and in each to follow the main channel of the river to its mouth, thence to follow the entrance channel dredged in 1883, and thence about at right angles to the entrance channel into the main channel of James River.

Reference was made in the preliminary report of October 29, 1910, to making a cut-off into the James through the bluff about 1¼ miles (by the channel) above the river's mouth. It has also been suggested that a channel through the Thoroughfare would give a more direct and favorable approach to this cut-off than by following the main channel. These features have been considered and estimates of their cost are found under the captions Project 1a, Project 1b, and Project 2a, Project 2b as modifications of the main project.

In both of the main and modified projects parallel bulkheads, about 100 feet apart, are proposed at the entrances to protect the channel from filling with sand washed from the adjacent bar during storms. The extremities of these bulkheads in the channel of the James are to be flared. It is also proposed in the modified projects to place a bulkhead across the main channel from near the mouth of the thoroughfare to the opposite shore, to prevent back filling from the flow in the main channel across the proposed channels.

The bulkheads are to consist of a single line of 3-inch pine sheet piling extending to about high tide, with penetrations of 3 to 6 feet, spiked to two lines of oak wales, 6 by 8 inches, one wale about at high water, the other about at low water, the wales being bolted to pine piles placed 6 feet from centers; the tops of the sheet piling are to be further secured by longitudinal oak strips 3 by 8 inches, placed against the face of the sheet piling and bolted through it to the top wales.

The following details are common to the projects and their modifications:

1. A bottom channel width of 60 feet.
2. Side slopes in Archers Hope River of 1 on 3.
3. Side slopes in James River of 1 on 3.
4. One foot over-depth allowance in dredging.
5. Revetting the bulkheads on both sides with material excavated in dredging.
6. Estimates are based on similar work in James River, allowance being made for greater difficulties. It is also assumed that the right to deposit dredged material on adjacent marshes is obtained by local interests, and any appropriation should be contingent upon such action.

In the modified projects side slopes of 1 on 1½ are assumed in the cut-off through the bluff opening.

The estimated cost of excavation in project 1 and its modifications is 40 cents per cubic yard; that in project 2 is 35 cents per cubic yard.

The estimated costs of bulkhead materials in place are as follows:

Pine piles	cents per linear foot..	27
Oak wales and strings	per M feet b. m..	$38
Pine sheet piling	do....	29

ESTIMATES.

Project 1, 6-foot channel.

(By main channel to the 7-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	13,000		
Excavation in channel	80,000		
Total	93,000	at 40 cents	$37,200
Bulkhead at entrance to mouth of Archers Hope River			2,155
Two bulkheads between western end of entrance and James River Channel			6,065
Engineering and contingencies			4,550
Total			49,970

Project 1a, 6-foot channel (modification of Project 1).

Via main channel to Thoroughfare, thence through Thoroughfare and across the main channel through the bluff opening to the 7-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	13,000		
Excavation in channel	131,000		
Total	144,000	at 40 cents	$57,600
Bulkhead across main channel in Archers Hope River at foot of Thoroughfare			1,576
Bulkheads in James River			5,257
Engineering and contingencies			6,443
Total			70,876

Project 1b, 6-foot channel (modification of Project 1).

(Main channel to foot of Thoroughfare, thence on a bend to a cut-off through bluff opening to the 7-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	13,000		
Excavation in channel	98,000		
Total	111,000	at 40 cents	$44,400
Bulkhead across main channel, near foot of Thoroughfare			1,576
Bulkheads in James River			5,257
Engineering and contingencies			5,123
Total			56,356

Project 2, 8-foot channel.

(Via main channel to 9-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	19,000		
Excavation in channel	143,000		
Total	162,000	at 35 cents	$56,700
Bulkhead at entrance to mouth of Archers Hope River			2,155
Bulkheads in James River			6,634
Engineering and contingencies			6,549
Total			72,038

Project 2a, 8-foot channel (modification of Project 2).

(Main channel to Thoroughfare, through the same, and across main channel through bluff opening to 9-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	19,000		
Excavation in channel	222,300		
Total	241,300	at 35 cents	$84,455
Bulkhead across main channel near foot of Thoroughfare			1,576
Bulkheads in James River			5,462
Engineering and contingencies			9,143
Total			100,636

Project 2b, 8-foot channel (modification of Project 2).

(Main channel to foot of Thoroughfare, thence in a curve to cut-off through bluff opening, and to 9-foot depth curve in James River.)

	Cubic yards.		
Excavation in turning basin	19,000		
Excavation in channel	154,600		
Total	173,600	at 35 cents	$60,760
Bulkhead in Archers Hope River			1,576
Bulkheads in James River			5,462
Engineering and contingencies			6,780
Total			74,578

SUMMARY OF COSTS.

Project 1	$49,970
Project 1*a* (modification of Project 1)	70,876
Project 1*b* (modification of Project 1)	56,356
Project 2	72,038
Project 2*a* (modification of Project 2)	100,636
Project 2*b* (modification of Project 2)	74,578

MAINTENANCE.

The average annual cost of maintaining the improvement in both projects and their modifications is $1,000.

As a depth of 8 feet is probably the least that would serve effectively for prospective commerce at Williamsburg, project 2 is recommended, if the river is to be improved. The work should be done in one year and the first appropriation should be for the whole amount of the estimate and subject to the condition that the right to deposit the dredge spoil on adjacent lands be obtained by local interests without cost to the United States.

Since the report on the preliminary examination was submitted, efforts to obtain further data as to the commerce of the river have been made, but nothing has been obtained of any value. No assurance has been given that a packet would be put on the river if the improvement were made. If such assurance could be had it would go to show that the river would probably be used for carrying commerce for the town of Williamsburg. Without this assurance it does not seem probable that the river would be used for this purpose on account of the landing being 1½ miles distant from the business center of the town, at an elevation of about 80 feet below it, without any terminal facilities, and with no other means of communication between the landing and the town than an ordinary country road. It would therefore appear that if the river were improved, it would be used almost entirely for carrying out forest products and the large expenditure required to improve it properly seems incommensurate with the benefits that would result to commerce.

Very respectfully,

W. C. Langfitt,
Lieut. Col., Corps of Engineers.

The Chief of Engineers, United States Army
(Through the Division Engineer).

[First indorsement.]

U. S. Engineer Office, Eastern Division,
New York City, October 23, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

Wm. T. Rossell,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

O

HUDSON RIVER, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF HUDSON RIVER, N. Y., WITH A VIEW TO SECURING INCREASED DEPTH.

December 12, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, December 11, 1912.

Sir: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated 25th ultimo, together with copy of a report from Col. W. M. Black, Corps of Engineers, dated February 27, 1912, on preliminary examination of Hudson River, N. Y., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, November 25, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary Examination of Hudson River, N. Y.

1. There is submitted herewith, for transmission to Congress, report dated February 27, 1912, by Col. W. M. Black, Corps of Engineers, on preliminary examination of Hudson River, N. Y., with a view to securing increased depth authorized by the river and harbor act approved June 25, 1910.

2. The existing project for improvement of Hudson River provides for a channel 12 feet deep at lowest low water (2.5 feet below mean low water), 200 feet wide from Waterford to the State dam at Troy, a distance of about 3 miles, and generally 400 feet wide thence to Hudson, about 39 miles from Waterford, with additional width at Albany and Troy and a new lock and dam at Troy to replace the existing one, which was built by the State in 1824. Below Hudson the depth of water is not less than 30 feet at mean low water, except at two small bars.

3. The district officer has given consideration to two depths, one suitable for the barge and vessel traffic which will use the Hudson in connection with the improved New York State canals and for the vessels plying locally between New York, Albany, and Troy, and the other suitable for ocean-going vessels with a view to making a point of transfer at the head of navigation of the Hudson instead of at New York City. For the latter, he states a draft of at least 25 feet must be provided requiring a minimum depth of 27 feet at lowest low water, and a width of 600 feet to Van Weis Point, 4 miles below Albany, above which point a width of 400 feet only could be obtained. After analyzing the commercial situation and the benefits to be derived from such a channel, and discussing the essentials of a good transfer point, and the advantages and disadvantages of New York City and the "capital district" centering at Albany, for such purposes, the district officer arrives at the conclusion that other things being equal, the most economical point for transfer to inland vessels would be on the seaboard, and that the present necessity for the creation of a ship channel on the upper Hudson has not been proved.

4. Taking up the question of dimensions for barge traffic, the district officer discusses the adequacy of the projected channel and of the clearance under a vessel afforded thereby, and from his observations he concludes that a depth of about 16 feet should be provided to give facilities fully adequate to insure the unhampered use of the river. It is shown, however, that with a depth of 14 feet the clearance of 2 feet necessary for safety can be maintained with some loss in speed and an increase in power. While the district officer believes that an increase in depth to 14 feet would be of great advantage to commerce and navigation, he is not satisfied that the annual saving to the people of the United States would be sufficient to warrant the expenditure required.

5. The district officer concludes with the opinion that a further improvement, with a view to securing increased depth over that provided for in the existing project, should be postponed until the effects of the opening of the New York barge canals on the character and volume of the commerce of the Hudson and on the type of vessels used in the trade shall have become manifest and the economic necessity for an increased depth shall have been proved.

6. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated June 24, 1912. Through a committee of its members the board inspected the portion of river under consideration and held a duly advertised public hearing which was attended by a large number of interested persons. The board concurs with the district officer, who is also the division engineer, that at the present time it is not advisable for the United States to undertake the further

improvement of the Hudson River with a view to securing increased depth.

7. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, who is also the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Hudson River between Hudson and Waterford, N. Y., further than as provided for under the existing project, is not deemed advisable at the present time.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

WAR DEPARTMENT,
THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., June 24, 1912.

SIR: 1. The board has the honor to submit the following review of the district officer's report on preliminary examination of Hudson River, N. Y., with a view to securing increased depth. Waterford is the head of the existing project and the recognized head of ordinary river navigation. The distance from Waterford to Troy is 3 miles, from Troy to Albany 10 miles, and from Albany to Hudson 26 miles, making the distance from Waterford to Hudson 39 miles. The depth of water below Hudson is not less than 30 feet, except at two small bars. This being the case, consideration is given in the within report only to the reach between Hudson and Waterford.

2. The United States entered upon the improvement of the Hudson River in 1831 and adopted a project for the reach between Waterford and New Baltimore, 12 miles above Hudson, the depth to be 12 feet at mean low water. The existing project, adopted by the act of June 25, 1910, provides for a channel 12 feet deep at lowest low water (2.5 feet below mean low water), 200 feet wide from Waterford to the State dam at Troy, and generally 400 feet wide thence to Hudson, with additional width at Albany and Troy, and a new lock and dam at Troy to replace the existing one, which was built by the State in 1824. The estimated cost of the existing project is $5,186,064. Several stretches of the river aggregating about 11 miles in length have less than the project depth. During low stages the tidal rise and fall at Hudson is 4.1 feet; at Albany, 2.88 feet; and at Troy, 2.92 feet. During spring months freshets of 8 feet or more may be expected at Albany. The reach under consideration is crossed by 6 drawbridges with openings varying from 45 feet to 165 feet.

3. Within the "capital district," centering at Albany, lie several towns and villages having a total population of 320,000, with a business capitalization estimated at $50,000,000. The total population of the territory tributary to the river north of New York City is estimated at 780,000, with a business capitalization of $200,000,000. The total commerce on the section of river north of Hudson during the calendar year 1910 is given as 5,033,360 short tons, valued at $109,941,000, and 1,378,000 passengers.

4. Some of the vessels on the Hudson River represent the latest development of large passenger steamers for navigation of inland waters on shallow draft. They are sidewheel boats from 330 to 427 feet long, 76 to 90 feet wide over the guards, 2,571 to 4,400 tons displacement, carrying about 2,000 first-class passengers and 2,000 tons of freight. These steamers travel at from 15 to 20 miles an hour in the lower reaches of the river, but are compelled to reduce the speed to an average of 7 to 12 miles an hour above Hudson. The largest day-line boats are licensed to carry 5,500 passengers. The deepest draft vessels navigating this portion of the river are tugs requiring 14 feet of water. These can be operated, therefore, only during high stages of the river. The ice, coal, and a good deal of miscellaneous freight is carried on barges of from 100 to 1,200 tons burden. The State Barge Canal is to have a depth of 12 feet and will accommodate barges drawing 10 feet and carrying as much as 3,000 tons. The State of New York is to spend $19,800,000 for canal terminals at various points, including Troy and Albany. Both of these cities are to make extensive water-front improvements. The district officer believes that the commerce which will be brought to the Hudson by the New York canal system will be not less than 15,000,000 tons per annum.

5. The act does not name any specific increase in depth to be considered. A study of the subject, however, suggests two depths, one suitable for the barge and vessel traffic which will use the Hudson in connection with the improved canals and for the vessels plying locally between New York and Albany and Troy, and the other suitable for ocean-going vessels with a view to making a point of transfer at the head of navigation on the Hudson instead of at New York City. To provide for seagoing vessels a draft of at least 25 feet must be permissible, requiring a minimum depth of 27 feet at lowest low water. The width should be 600 feet as far up as practicable, which would probably be Van Weis Point, 4 miles below Albany, above which point no greater general width to Albany could probably be had than 400 feet. After analyzing the commercial situation, the benefits to be derived from such a channel, and discussing the essentials of a good transfer point and the advantages and disadvantages of New York City and the capital district for such purposes, the district officer arrives at the conclusion that, other things being equal, the most economical point for transfer to inland vessels would be on the seaboard, and that the present necessity for the creation of a ship channel in the upper Hudson has not been proved.

6. Taking up the question of dimensions for barge traffic, the first point discussed by the district officer is the adequacy of the projected channel in the Hudson 12 feet deep at lowest low water to meet the requirements of present and prospective commerce. In considering this question, not only the traffic of the canals must be considered, but also the local traffic of the Hudson, which is very valuable and important and must not be allowed to interfere with other navigation. While a depth of 12 feet in a quiet canal may be sufficient, this is not necessarily so in an open waterway where greater speed is desired.

7. The larger vessels used on the Hudson are generally designed for a draft of 10 feet when loaded. There should be a clearance

under a vessel of 2 feet for safe navigation, and observations taken in connection with this investigation show that this clearance will not obtain when the squat of the vessels is taken into account. In reference to this phase of the subject, as well as the horsepower consumed and waves developed with vessels of different draft at different rates of speed, the district officer presents an extended discussion, from which he concludes that a depth of about 16 feet should be provided to give facilities fully adequate to the unhampered use of the river. It is shown, however, that with a depth of 14 feet the clearance of 2 feet necessary for safety can be maintained with some loss in speed and an increase in power. While the district officer believes that an increase in depth to 14 feet would be of great advantage to commerce and navigation, he is not satisfied that the annual saving to the people of the United States would be sufficient to warrant the expenditure required.

8. The district officer concludes with the opinion that a further improvement of the Hudson River with a view to obtaining increased depth over that called for under the approved project should be postponed until the effects of the opening of the New York barge canals on the character and volume of the commerce of the Hudson and on the type of vessels used in the trade shall have become manifest and the economic necessity for an increased depth shall have been proved.

9. On May 23, 1912, through a committee of its members, the board visited the upper Hudson, made an inspection of the river between Albany and Hudson and held a duly advertised hearing which was attended by a large number of interested persons, many of whom addressed the board in reference to the advantages that would accrue to the community if a sufficient depth were given to permit ocean vessels to reach Albany or Troy and locate the point of transfer in this vicinity instead of at New York. No one advocated increasing the depth of the present project in the interests of barge or local vessel traffic, and nothing was presented to the board that had not been considered by the district officer.

10. In view of the available data, the board concurs in the opinion of the district officer, who is also division engineer, that at the present time it is not advisable for the United States to undertake the further improvement of the Hudson River with a view to securing increased depth, either in the interests of barge and steamboat traffic or of seagoing vessels.

11. In compliance with law, the board reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

Very respectfully,

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

The Chief of Engineers, United States Army.

PRELIMINARY EXAMINATION OF HUDSON RIVER, N. Y.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New York City, February 27, 1912.

SIR: 1. I have the honor to submit herewith a report on a preliminary examination of the Hudson River, N. Y., with a view to securing increased depth as required by the river and harbor act approved June 25, 1910.

I. THE LOCALITY.

2. That portion of the Hudson River which, since 1830, has been treated as a part of the navigable waters of the United States extends from the town of Waterford, located about 3 miles above Troy, N. Y., southward to New York Bay. The city of Hudson is located about 39 miles south of the head of navigation at Waterford; and south of Hudson the river in its natural condition has (except at two small isolated bars mentioned later) a channel depth of not less than 30 feet at mean low water with ample width for navigation by a much greater commerce than now exists or is anticipated in the near future. It is understood that the act of Congress referred to requires a report on the through channel only—the needs of the various cities along the river for additional depths to give access to their respective water fronts having been provided for or considered under separate projects. In the act of June 25, 1910, Congress directed such a report for the portion of the Hudson River which forms a part of the harbor of New York, which report is about to be submitted as a separate document. In this understanding the following report deals only with an increase of depths desired in the portion of the river to the north of the city of Hudson, the commercial reasons for such an increase, the works of improvements which would be required, and their cost. The subject has been investigated carefully under my direction by Lieut. R. D. Black, Corps of Engineers, in local charge of the improvement of the upper Hudson, and a public hearing was held at Albany by myself to secure a full expression of opinions.

II. SOURCES OF DATA.

3. *Physical.*—The accompanying chart is prepared from a larger chart based on extended surveys made in 1909. The river has been under study for many years, and the records show the character of the banks and bed, the regimen of the stream, and its tidal phenomena. Special observations were made in September and October, 1911, by authority of the Chief of Engineers, to determine the effects of channel depth on the draft of vessels when underway, on the power consumed in attaining a given speed, and on the pull on a tow line. The results are given later in this report.

4. *Commercial.*—The latest compilation of commercial statistics of the Hudson River is embodied in the Annual Report of the Chief of Engineers for the fiscal year 1911 (p. 1273). Much of the work of collection and tabulation was done by the chambers of commerce of the cities of Albany and Troy, who endeavored to reach by circular letters, followed by personal interviews when necessary, all of the

merchants and transportation lines in their respective communities. Individual shippers in small towns along the river and the transportation lines were canvassed directly by the office; and all of the data obtained were carefully revised, compared, and tabulated with the object of eradicating duplications and other inaccuracies. These statistics are included hereinafter (par. 24) and are believed to be fairly accurate as far as they go, though it is probable that they represent something less than the full commerce of the waterway, due to difficulties attending the work of collection. Chambers of commerce or other commercial bodies in all the important cities of the upper Hudson have been requested to submit their views on the subject, supported by statistics or other data. Through the press and by direct correspondence with commercial organizations, an offer to hold public hearings has been in force since August 3, 1911; and at the request of the Chamber of Commerce and the City Plan Association of Albany, a public hearing was held in Albany on December 18, 1911. The minutes of this hearing and copies of briefs and other documents submitted are appended hereto as inclosures A and B, respectively. The New York offices of certain steamship companies thought to be interested and the most important navigation interests operating on the Hudson have been communicated with; and correspondence resulting therefrom is appended as inclosure C.[1] A number of communications received prior to August 16, 1911, are appended as inclosure D.[1]

III. HISTORY OF IMPROVEMENTS.

5. *Early improvements by State of New York.*—Before the improvement of the Hudson River was undertaken by the United States the channel north of the town of New Baltimore as far as Troy was exceedingly tortuous and unstable, with a minimum depth at mean low water above Albany of 4 feet, and of 7½ feet below. The river was obstructed chiefly by sand bars, whose location and extent were continually changing. Improvement was commenced by the State of New York in 1797. At that time the head of sloop navigation being just below Albany, an attempt was made to improve the channel from there to Troy by the construction of wing dams; and previous to 1819 the State had appropriated $148,707.94 for this purpose. In 1800 the improvement was extended to Lansingburg and in 1804 work below Albany was authorized. From then until 1833 the State of New York continued the construction of wing dams and deepened some of the reaches by dredging. In 1824 a lock and dam were constructed at Troy, and thereby navigation to and from the new Champlain Canal was opened.

6. *Early work of the United States.*—In 1831 the jurisdiction over the river was formally taken over by the Federal Government and a project for improving the river between Waterford and New Baltimore (which lies 12 miles above Hudson) was prepared. The plan of improvement contemplated the deepening of the channel between Waterford and New Baltimore by dredging, and between Troy and New Baltimore the regulation of the river and maintenance of the channel by confining the currents during the low stages between longitudinal dikes. It was attempted so to regulate the height of

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[1] Not printed.

the various dikes that the desired erosive action would take place without a detrimental deposit during high stages. Under this project prior to 1843 a channel with a limiting depth of 7½ feet at mean low water was created below Albany, but subsequently the longitudinal dikes failed to maintain the channel satisfactorily.

7. *From 1838 to 1892.*—Between 1838 and 1863 dredging operations and other work were carried on intermittently, chiefly in endeavors to perpetuate the benefits secured as a result of the earlier work, and between 1863 and 1866 extensive dike construction, following plans adopted by the War Department in 1834, was carried on by the State of New York. In 1866 Gen. John Newton, Corps of Engineers, submitted a report embodying a thorough history and discussion of the past work of improvement and a carefully prepared project for further improvement with a view to obtaining a depth of 11 feet at mean low water below Albany and of 9 feet above. Gen. Newton strongly condemned the policy of utilizing erosive action of the currents to produce the desired channel depths, and advocated the use of longitudinal dikes for channel maintenance only. Until 1890 the State of New York rendered material assistance in carrying out Gen. Newton's project, and by 1892 practically all of the work proposed, except the widening of the channel opposite New Baltimore, had been completed. However, the early dikes and those built under Gen. Newton's project did not fully accomplish their function of maintaining the channel at its full depth, and in 1892 there were a number of bars in the river over which the depth at mean low water was between 8 and 10 feet.

8. *Last completed project.*—In 1891 a special board of engineers made a comparative study of three proposed projects—one for a depth of 22 feet between New York and Albany, one for a depth of 22 feet between New York and Troy, and one for a depth of 12 feet at mean low water between Coxsackie and Troy. As a result of the recommendations of this board a new project was adopted providing for a channel between Coxsackie and the State dam at Troy 12 feet deep at mean low water and south of Troy 400 feet wide. The depth was to be obtained by dredging and the channel to be maintained by altering and amplifying the existing system of dikes in accordance with the general principles established by Gen. Newton. This project was modified in 1898, involving an increase in the estimtaed cost, and was practically completed in 1910, with, to June 30 of that year, an expenditure of $3,743,231.67.

9. *Existing project.*—With as its chief object the enlargement of the channel to give adequate facilities throughout the navigation season for the commerce which is anticipated after the completion of the New York State Barge Canal a new project was adopted by the river and harbor act of June 25, 1910. This project provides for a channel 12 feet deep at the lowest stage of the river, 200 feet wide from Waterford to the State dam at Troy, and generally 400 feet wide thence to Hudson. The proposed channel widens still further at Albany and Troy to give adequate harbor room. The project provides for the construction of a new lock and dam at Troy to replace the existing State lock and dam. The total estimated cost of this project is $5,186,064. The sum of $1,350,000 was appropriated in 1910 and $750,000 in 1911. These appropriations were made with a view to

completing the project in four working seasons. Work under this project is now in progress.

10. *Expenditures.*—Prior to 1863 the United States had expended $420,000 for improvement. Under Gen. Newton's project of 1866, $1,248,000 were expended. Under the project of 1892, as revised in 1898, about $3,750,000 were expended, and under the existing project $81,930 have been expended to January 1, 1912, making a total expenditure by the Federal Government of about $5,500,000 for the improvement of the Hudson River. In its work of improvement prior to 1831 the State of New York expended about $365,000 and under the plans formulated by the engineer board of the General Government in 1834 and by Gen. Newton the State has expended $1,155,249.

IV. EXAMINATIONS AND SURVEYS.

11. Reports on examinations and surveys of the Hudson River called for by various acts of Congress are printed in the following documents:

1832. House, Twenty-second Congress, first session, Document No. 189.
1854. Executive, Thirty-third Congress, first session, Document No. 1, Appendix T.
1875. Senate, Forty-third Congress, second session, Document No. 19, Part I.
1888. House, Fiftieth Congress, first session, Document No. 205.
1892. House, Fifty-second Congress, first session, Document No. 23.
1895. House, Fifty-fourth Congress, second session, Document No. 231.
1898. House, Fifty-fifth Congress, first session, Document No. 86.
1905. Fifty-eighth Congress, second session, Document No. 307.
1907. House, Fifty-ninth Congress, second session, Document No. 539.
1910. House, Sixty-first Congress, second session, Document No. 719.

Work on the present examination was planned with the object of submitting this report in August, 1911. However, the investigations which had been made developed the advisability of carrying on observations in the field in connection with the squat of vessels. In December the submission of the report was again delayed by the request of the Chamber of Commerce of Albany and others for a public hearing.

V. EXISTING PHYSICAL CHARACTERISTICS.

12. *Planes of reference.*—Prior to the adoption of the existing project all depths in the river were referred to an assumed plane of mean low water. From May 1 to November 30, during the years 1908–1910, inclusive, the river surface fell 1 foot below this plane seventy times, 1.5 feet and lower sixteen times, and 1.9 feet twice. In the preparation of the existing project, which was to provide a depth of 12 feet at the lowest stage of the river, it was deemed advisable to establish a new plane of reference, which was to be an assumed plane of "lowest low water." Such a plane has been established with an elevation 2.5 feet below that of old mean low water and the water surface has not fallen below its elevation at any time during the past 18 years. Throughout the remainder of this report depths will be referred to the adopted plane of lowest low water.

13. *Status of work and existing depths.*—Dredging and dike construction under the existing project have not been commenced. As shown by surveys made during the past year, the limiting depths in the channel are shown by the following table:

From—	To—	Distance.	12 feet or more.	10 to 12 feet.	8 to 10 feet.	Less than 8 feet.
		Feet.				
Hudson Lighthouse	Coxsackie	38,900	37,100	1,800	....	....
Coxsackie Ferry	Albany	111,900	62,500	38,600	10,800	....
Albany	Broadway, Troy	34,800	2,560	22,000	10,300	....
Broadway, Troy	State Dam	5,700	....	2,600	2,100	1,000
State dam	Waterford	13,900	11,400	2,500	....	....

14. *Regimen.*—In the reach of the river above Hudson there are two causes of fluctuation in the water level, tides and freshets. During low stages there is a total mean tidal rise and fall of 4.10 feet at Hudson, 2.88 feet at Albany, and 2.92 feet at Troy. During the months of March, April, and May freshets may be expected at Albany of 8 feet or more in height above the plane of lowest low water and lasting through periods of 10 days. Though their fundamental cause is rain and the melting of snow in the headwaters of the river, the freshets in January, February, and March are aggravated by the formation of ice dams. During warm months freshets may be expected from 8 to 14 feet in height at Albany above the plane of lowest low water with from 3 to 5 days' duration. These freshets are always the result of heavy rains in either the upper Hudson or Mohawk watersheds, or in both. During low-water stages at Albany there is an ebb current of varying velocity for about seven hours at each tide and a clearly definable flood current for about four hours. During freshets of from 5 to 6 feet in height the flood current disappears and the tidal wave is felt only by small daily fluctuations in the water surface. When the freshet height reaches 10 feet above the plane of lowest low water, the tidal action ceases to be apparent. During low-water stages the velocity of the flood current varies from nothing to about 1 foot per second and the velocity of the ebb current from nothing to about 1.20 feet per second. During freshets of not less than 6 feet in height the flood current disappears and there is an ebb current of about 2.5 feet per second. During such periods the average difference in the velocity of the ebb current between the flood and ebb tide stages is about 2 feet per second. During extreme freshets the current reaches a velocity of nearly 4.5 feet per second.

15. *Character of river bed.*—Under the bottom of the river, ledge rock, generally of a shaly character (known as Hudson River shale), rises at intervals to a reference of from 30 to 9 feet below the plane of lowest low water with a maximum elevation of −9 feet where excavation has been carried on under past projects at New Baltimore, North Coeymans, Mulls Crossover, Van Wies Point, Overslaugh, Breaker Island, and Troy. Overlying this rock is a deposit of gravel and sand, with a slight overlying layer of silt and other matter brought in from the city sewers and by littoral drainage. The sand is generally very fine in the reach of the river near Hudson, increasing in coarseness to a coarse gravel immediately below the State dam. Just above the State dam is a deposit of fine material and from there to

Waterford the material is chiefly gravel, with a number of bowlders. Very little silt is carried into the river by the upper Hudson, but during freshets the Hoosick and Mohawk bring down a considerable quantity. Where not formed by ledge rock or when not caused by ice dams, the bars are thought to be chiefly the result of a gradual movement downstream of light material, induced by the changes in flow between times of freshet and times of low water.

16. *Bridges.*—The reach of the river under consideration is crossed by the following bridges: A highway and trolley-car bridge at North Troy called the Lansingburg bridge; the Delaware & Hudson Co.'s railroad, highway and trolley-car bridge at Federal Street, Troy; a highway and trolley-car bridge at Congress Street, Troy; two railroad bridges at Albany, and a trolley-car and highway bridge (known as the Albany and Greenbush Bridge) at Albany. Each of these bridges has a draw. The bridge at North Troy and the Delaware & Hudson bridges have their pivot piers on shore and have only one opening. The other bridges have two draw openings. The widths of these draw openings are as follows: Lansingburg, 55 feet; Delaware & Hudson, 45 feet; Congress Street, 110 feet; New York Central freight, 103 feet; New York Central passenger, 109 feet; Greenbush, 165 feet.

VI. COMMERCIAL LOCATION.

17. *Position in the waterway system of the United States.*—By their relation to the general movement of commerce, the waterways of the United States may be considered as forming three distinct systems of through, connected thoroughfares—the Atlantic system, the Mississippi system, and the Pacific system. The Atlantic system comprises the Atlantic Ocean, the Great Lakes, the waterways connecting them with each other and the ocean, the Gulf of Mexico, the harbors along the coast, the coastal canals, and the streams reaching inland from the seaboard. The Mississippi system comprises the great rivers draining the central valley of the United States with an outlet on the Gulf of Mexico. The Pacific system comprises the Pacific Ocean and the rivers and harbors of the Pacific slope. The Mississippi and Ohio Rivers are connected by canals with the Great Lakes, and the three systems will soon be joined by the Panama Canal, the whole constituting the continuous waterways of the United States. The navigable portion of the Hudson River reaches inland from New York City to the center of an important commercial community and to a confluence of existing routes of transportation, both rail and water, from New England, Canada, and the Great Lakes. Hence, by virtue of its location this river forms a most important connecting link in the great Atlantic system. Space does not admit, and the subject is too generally understood to necessitate a description of the commercial centers on the connecting branches of the system; but, as will be shown later, the river supports a not inconsiderable local commerce, whose sources will be described. Much of the service of any waterway depends on its railroad connections and its physical relation to paralleling railroad lines, and it is thought that these and the northern water connections, the New York canals, should be described in some detail.

18. *Tributary ports, capital district.*—The cities of Albany, Troy, Watervliet, and Rensselaer lie along the banks of the Hudson within the upper 10 miles of its navigable portion. Within economical trucking distance of the river and connected with it by good roads are the cities of Schenectady and Cohoes. These cities, together with the villages of Waterford and Green Island, form the so-called "capital district." Its total population is about 320,000 and its business capitalization exclusive of Schenectady is estimated at $50,000,000. The General Electric Co. and the American Locomotive Works at Schenectady are capitalized at $65,000,000 and $50,000,000, respectively. Of these amounts, 130,000 population and $30,000,000 capital may be considered as centering at Troy, about 10 miles north of Albany. Much detailed information regarding the business of the capital district will be found in inclosure B, and in the last half of inclosure A hereto.

19. *Tributary ports between Albany and New York.*—The most important ports of the Hudson River between Albany and New York are Hudson, Kingston, Poughkeepsie, Newburgh, and Yonkers, with a total population of about 172,000. In addition to these cities there are situated on the banks of the river about 25 towns ranging in population from 1,500 to 5,000, and aggregating about 50,000. These cities and towns support a considerable business in the manufacture of cement, brick, and miscellaneous merchandise, the quarrying of rock and the cutting of ice. The rural district is to a considerable extent devoted to fruit raising, truck farming, and dairying.

20. *Population of tributary district.*—The total population of the territory immediately tributary to the river north of New York City which uses it to a greater or less extent in its local intercommunicative commerce and in its commerce with the markets of New York and Jersey City is estimated at 780,000 and the total capitalization valuation of its business at $200,000,000.

21. *Railroads.*—The New York Central Railroad with its main line on the east bank and its West Shore Division on the west bank follows the Hudson from New York to Albany and on the east bank to Troy. The water route through the Champlain Canal and Lake Champlain is paralleled by the Adirondack and Rutland divisions of the New York Central Railroad, the Delaware & Hudson Railroad, and the Grand Trunk Railroad, which now has an outlet on Narrangansett Bay. The water routes to the West through the Erie Canal are paralleled by the New York Central Railroad and its branches, the Pennsylvania, the Baltimore & Ohio, the Lehigh Valley, the Delaware, Lackawanna & Western, and the Erie. The Boston & Maine reaches the river at Troy and the Boston & Albany at Rensselaer. The New York, New Haven & Hartford meets the river at Poughkeepsie and the Erie and New York, Ontario & Western in the vicinity of Newburgh. The cities of Albany and Troy are division points for all the railroads passing through them.

22. *Canals.*—Through water connection to the north is made by the Champlain Canal from the Hudson at Waterford to Whitehall on Lake Champlain and from Lake Champlain to Sorel on the St. Lawrence by the Richelieu River and the Canadian Chambly Canal. Through water connection to the Great Lakes is made by the Erie Canal from Waterford to Tonawanda on the Niagara River, and via the Oswego Canal to Lake Ontario at Oswego. The old Erie and Champlain Canals

have a depth of 6 feet over the miter sills of the locks and are navigable by boats carrying from 150 to 200 tons. These canals are soon to be superseded by the new barge canals, which will be described in the chapter on improvements.

VII. EXISTING COMMERCIAL STATUS.

23. *Introductory.*—The geographical location of the Hudson River has been defined. It has been shown that the river connects a number of cities situated on its banks and that as a link in the Atlantic waterways system, it lies in the path of a great annual movement of merchandise and produce between the North and West and the Atlantic seaboard, and has at its mouth the greatest port in the United States. To facilitate the study of its present and prospective commerce, the river may be considered as performing three somewhat distinct services; first, as a carrier of local commerce between and originating in the cities along its banks; second, as a carrier of through waterborne commerce between the seaboard at New York and Lake Champlain, the St. Lawrence River, and the Great Lakes; and, third, as part of water and rail routes from the Atlantic Ocean by water to Albany and Troy, and thence by rail to the North and West. The purpose of the remarks which immediately follow is to indicate quantitatively and qualitatively the manner in which the river is performing these services to-day, to describe briefly the vessels and terminal facilities now in use, and the rates which prevail.

24. *Tonnage.*—The following table taken from the Annual Report of the Chief of Engineers for 1911, gives the total tonnage carried on the section of the river north of Hudson during the calendar year ending December 31, 1910:

Freight handled in 1910.

Class.	Short tons.	Value.
Merchandise	885,000	$52,630,000
Coal and other fuel	938,000	4,690,000
Building material	888,000	6,650,000
Manufactures	170,000	35,150,000
Minerals	210,000	2,310,000
Farm products	197,000	6,895,000
Ice	1,735,700	1,180,000
Ashes, pot and pearl	9,000	348,500
Fish	660	87,500
Total	5,033,360	109,941,000

Of the total tonnage given in this table, the Champlain and Erie Canals carried to or from the river 1,341,832 tons, valued at $35,404,978, which indicate what the river is now doing in its service as a carrier of through water-borne commerce between the seaboard and the North and West. About 25 per cent of the canal-carried traffic follows the Hudson-Lake Champlain route, the remainder going to and from the West and Northwest. The 360,000 tons, valued at $28,740,000, estimated as the tonnage carried to or from the river by railroads, indicates the service performed by the river as a part of the through rail and water routes. This would leave 3,331,528 tons, valued at $45,796,022, as the local commerce carried in 1910 by the portion of the river north of Hudson. The above figures were compiled by the local United States engineer office, and by reason of the difficulties attending the collection of commercial statistics it is believed, as stated above, that they are distinctly conservative.

25. *Passenger traffic.*—During the season of 1910, 1,378,000 passengers were carried on the reach of the river above Hudson. The passenger traffic on the Hudson River has been steadily growing and is now very important. However, its future importance is thought to be relatively less than that of the freight business, and for that reason it is given here without any attempt to differentiate between local and through traffic. Parenthetically, it should be noted that the figure appearing in the report of the Board of Engineers of 1891, which shows a much larger number of passengers, includes the traffic of the entire river.

26. *Character of local commerce.*—The cities of Troy, Cohoes, and Schenectady are essentially manufacturing communities. Albany is more essentially a banking and residential city, with most of the characteristics common to capital cities. The principal industry of Troy is the manufacture of collars and shirts, but it supports in addition an important iron works, a paper mill, instrument factories, and a number of minor industries. Cohoes is chiefly devoted to the manufacture of textiles. Schenectady is the home of the American Locomotive Works and the General Electric Co. Albany is an important lumber market; contains a structural-steel plant, a car-wheel foundry, a number of breweries, a chemical works, and less important manufacturing institutions, and supports a considerable retail trade in general merchandise. At the Watervliet Arsenal cannon for the Field and Coast Artillery of the United States are manufactured, and this arsenal, together with the Navy gun shops at the Washington Navy Yard, are the only effective plants in the country for the manufacture of heavy ordnance. The New York Central Railroad and the Delaware & Hudson Co. have extensive car-building and general repair shops at Albany, Rensselaer, and Green Island. The manufacture of brick and cement and the harvesting of ice along the river have been mentioned. Most of the transportation business of the community is done by rail, but the river handles lumber, ice, building materials, and considerable package freight.

27. *Through business.*—The through business paralleling the Hudson is too diversified in character, too great in quantity, and too generally known to warrant discussion in connection with the present day traffic. The through business of the river is chiefly in low price, heavy bulk commodities. (See par. 24.)

28. *Percentage of total tonnage carried by river and reasons therefor.*—While it has been impracticable to compile accurate statistics regarding the tonnage which parallels this route, it is believed that during the season of navigation, which opens in March or April and usually closes early in December of each year, the river carries at least 25 per cent of the local commerce and not over 4 per cent of the total following the through routes described above. It has a practical monopoly, however, in the carriage of ice. Its failure to carry a greater portion of the local commerce is believed to be due primarily to the difficulties and cost of handling the goods at the wharves; that is, to poor terminal facilities. The fundamental

reasons for its failure to carry a larger percentage of the through-freight commerce are the limitations imposed by the old Erie and Champlain Canals. Statistics of the commerce on these canals show a continual falling off since 1872 in spite of the fact that freight rates on the canals have been uniformly lower than paralleling railroad rates, and that the canals are used free of toll. This fact is accounted for by the character and equipment of the canals. The limiting volume of the commerce of a canal is determined by its capacity for lockage. Since 1872, when this limit was reached for the Erie Canal, traffic has decreased for two reasons: First, the lack of precision in delivery due to delays in lockage and, second, the decrease in the number of available boats. The first is a function of the antiquated design of the old canals. The second results from disinclination on the part of boatmen to build new boats in the face of an inevitable radical change in the standard type of boat, which will follow the opening of the new canals, and the present uncertainty as to the type which will be evolved. For example, a recent report from Lake Champlain shows that in 1911 the water-borne commerce was almost exactly equal to that of 1910, that every available boat was in service, that there were no delays in obtaining cargoes, and that as a result rates were materially higher. Further, through-water commerce has been handicapped by the lack of proper transfer facilities, excessive dock and cartage charges, lack of efficient business management, and unwillingness of the railroads to prorate and through rate on reasonable terms. As distinctly pertinent to the situation on the Hudson, the following is quoted from page 19 of the "Preliminary Report of the Inland Waterways Commission," House Document 325, Sixtieth Congress, first session:

> While the decline of navigation in the inland waterways was largely due to the natural growth and legitimate competition attending railway extension, it is also clear that railway interests have been successfully directed against the normal maintenance and development of water traffic by control of water fronts and terminals, by acquisition or control of competing canals and vessels, by discriminating tariffs, by rebates, by adverse placement of tracks and structures, and by other means.

29. *Vessels.*—Three distinct types of vessels perform the bulk of the river's carrying business to-day—the river steamers, barges engaged exclusively in river traffic, and canal boats, chiefly engaged in the through traffic to the North and West.

30. *Vessels engaged in local commerce.*—The local commerce is carried in river steamers, coal, oil, and ice in barges, brick barges, and scows, and to a lesser degree in canal boats. Of the passengers reported for 1910, 800,000 were carried in ferryboats or small steamers between Troy and Albany and other points in the upper Hudson, and the remainder of the passengers and most of the package freight were carried by three lines operating large steamers between New York and Albany and Troy—the Hudson Navigation Co., the Manhattan Line, and Hudson River Day Line. In the spring of 1911, a fourth line of passenger steamers, known as the Capital City Line, was placed in operation between New York and Albany. The Hudson Navigation Co. owns four large steamers, with a fifth launched. These vessels represent the latest development of large passenger steamers for the navigation of inland waters on shallow draft. They are from 330 to 427 feet long, from 76 to 90 feet beam,

and from 2,571 to 4,400 tons displacement, and carry about 2,000 first-class passengers and 2,000 tons of freight each. They are propelled by paddle wheels and operate at from 15 to 18 miles per hour. The Hudson Navigation Co., the Manhattan Navigation Co., and the Capital City Line operate at night. The Hudson River Day Line operates four large steamers, the largest being the *Hendrick Hudson*, a vessel 400 feet long, 82 feet beam, and of 2,600 tons displacement on a draft of 9½ to 10 feet. All of the steamers of this line travel 20 miles an hour in the lower reaches of the river, but are compelled to reduce their speed to an average of from 7 to 12 miles an hour above Hudson. The largest steamers are licensed to carry 5,500 passengers. This line has under construction a new steamer larger and finer than the *Hendrick Hudson*. The deepest-draft vessels now navigating the river are powerful screw tugs. These boats require 14 feet of water and therefore can be operated only during the higher stages of the river, forcing the use during low water of smaller tugs at greater expense. The ice, coal, and a good deal of the miscellaneous package freight, composing a large part of the local traffic, are carried in barges of from 100 to 1,200 tons burden. These barges range from 100 to 250 feet long and from 16 to 40 feet wide and draw from 6 to 12 feet of water. During the past year a new type of steel barge has been introduced on the river by the Standard Oil Co. These barges, which are typical of the standard type which is replacing the older vessels engaged in the coastwise traffic, are usually about 300 feet long, 30 to 40 feet beam, and draw when fully loaded about 12 feet of water. A small number of seagoing sailing vessels comes up the Hudson under tow, loaded generally with southern lumber and returning with molding sand, cement, brick, etc.

31. *Vessels for canal traffic.*—The commerce to and from the canals is carried by canal boats of a type which has been in use since 1830, vessels about 100 feet long, 16 to 20 feet wide, and drawing from 4 to 6 feet of water. Below Troy these boats are usually handled in tows of from 6 to 60 boats. Most of this business is done at night.

32. *Vessels for freight to be transshipped.*—At present the commerce taken to and from the river by rail has developed no particular type of craft. It is carried by the vessels engaged in the local commerce. Car floats have not yet appeared on the upper Hudson.

33. *Terminal facilities.*—At the ports of Albany, Troy, and other neighboring cities and on Lake Champlain there are to-day no publicly owned wharves. The best wharves are owned and operated by the railroad companies, industrial corporations, and the larger navigation companies, and at few if any of these wharves are the facilities offered to all on equal terms. Further, the wharves themselves have, with few exceptions, no mechanical appliances for handling of freight and are poorly adapted to the rapid and economical transfer of merchandise between boat and train or dray. Along the river the ice houses have equipped themselves with mechanical apparatus for loading barges, but with this exception conditions are practically as stated above. These conditions also prevail to a greater or less extent in New York, and there cartage charges are excessive. The terminal situation at New York will be given further consideration later in connection with the demand for a new transfer point on the Hudson.

34. *Local rates.*—Freight rates on the river from Troy or Albany to New York for different classes of freight vary slightly from the following figures:

Class.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Rate per hundredweight	23	19	15	12	10	9

Paralleling rail rates per hundredweight are approximately as follows:

Class.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Rate	26	21	17	13	11	9
Rate with lighterage	27	22	18	14	12	10

The above figures suggest rates by combined rail and water routes. Passenger railroad rates between New York and Albany are $3.10 for transportation and 75 cents for Pullman accommodations. The river steamers charge from 50 cents to $1.50 for transportation and from 50 cents to $6 for staterooms.

35. *Through rates.*—The following through rates for the shipment of bulk commodities are deduced from figures given on page 1065 of the Summary of Commerce and Finance of the United States, Report of the Department of Commerce and Labor for December, 1910:

	Per ton.
From Duluth, Minn., to New York:	
By lake and canal	$1.8955
By lake and rail	2.3803
(a) By rail for domestic consumption	3.2320
(b) By rail consigned and delivered to steamers in New York	2.626
From Buffalo to New York:	
By canal	1.35

NOTE.—One bushel grain weighs 60 pounds, hence 1 short ton contains about 33⅓ bushels.

The water haul from Chicago to Buffalo being nearly equal to that from Duluth to Buffalo, the water rates given above should approximate the rates from Chicago. The influence of car-float handling in New York Harbor and the inadequate facilities for handling merchandise destined for delivery in that city, both to be discussed later, are suggested by the difference between items *a* and *b* above. Water rates from Plattsburg, N. Y., to New York City are from $1.25 to $2 per ton for the different classes of freight. Rail rates are from $0.17 to $0.45 per hundredweight for the different classes of freight. Iron ore can be shipped by water from Port Henry, N. Y., to New York City for $1.10 per ton, and by rail for $1.55 per ton. The above rates are thought to be typical. Further information regarding rates can be obtained from the reports of the Department of Commerce and Labor.

36. *Summary commercial status.*—To sum up the commercial situation, it may be said that the Hudson River is handling to-day a large local traffic which has reached its profitable limit under exist-

ing conditions with regard to terminal and channel facilities; that there is a considerable through traffic borne by the river, but that this is only a small percentage of the through traffic carried by paralleling rail and water routes, because of poor existing facilities on the connecting canals, poor terminal facilities, heavy transfer charges, and active railroad competition; that the resources of the territory tributary to the river are far from fully developed; and that a large water-bourne traffic from the North and West to the sea is diverted from the route of the New York State canals and the Hudson River to the Canadian waterways. The business interests of the State of New York are looking to the opening of the barge canals from an attitude at once skeptical and anticipatory of important benefits. Capital, as represented by the more conservative element, has not demonstrated its readiness to back the use on an extended scale of untried facilities for water transportation; but a new business element exists and is growing which is keenly alive to the possibilities arising from the commercial location of the Hudson as an important element of the Atlantic waterway system and most confident of the realization of great benefits to result from the improvement of the river on a scale not heretofore attempted.

VIII. IMPROVEMENTS UNDER WAY OR PROJECTED.

37. *List.*—Many of the conditions responsible for the present commercial status of the Atlantic system are unstable; and a number of improvements are now under way which when completed will alter the situation materially. The most important in their influence on the Hudson River are the New York State barge canals; the existing project for deepening the Hudson River; the project of the State of New York for the construction of State-owned canal terminals; and the Panama Canal. In addition, local terminal projects under consideration by the cities of Burlington, Vt., Troy, Albany, and New York, pending laws to regulate railroad traffic, a project for the construction of storage reservoirs in the headwaters of the Hudson and Mohawk Rivers by the State of New York, a Canadian project for a new canal connecting Lake Champlain with the St. Lawrence River, and the intracoastal canal project, seem at this time destined to influence directly and favorably the commercial usefulness of the Hudson River.

38. *Barge canals.*—The New York State barge canal system comprises the new Champlain Canal connecting the upper Hudson at Waterford with the head of Lake Champlain at Whitehall, the new Erie Canal connecting the Hudson at Waterford with Lake Erie at Buffalo, the new Oswego Canal connecting the Erie Canal with Lake Ontario at Oswego, and the new Cayuga & Seneca Canal connecting the Erie Canal with Lakes Cayuga and Seneca. These canals are parts of a single system in which the ruling depth over the miter sills of the locks is 12 feet, the usable length between the miter gates is 310 feet, the width of the locks is 45 feet, and the clear head room under numerous bridges is 15½ feet. The canals are designed for navigation by barges of from 1,000 to 3,000 tons capacity to be operated either under their own power or in small tows; and it is hoped that construction will have advanced sufficiently by 1913 or 1914 to permit the opening of navigation from the North and West as

far south as Waterford. Connection with the Hudson River requires the construction of a lock and dam at Troy, which, though provided for under the existing project for improving the Hudson, has not yet been commenced.

39. *Hudson River project.*—The existing project for improving the Hudson River is designed to provide facilities equal to those furnished by the barge canals. The lock proposed by the United States to be built at Troy has the same dimensions as the barge canal locks, except that it is designed for 14 feet depth over the miter sills and to have a chamber 480 feet long with three sets of gates, the intermediate set dividing the chamber into two smaller chambers, one 310 feet long and the other 155 feet long. It was intended to have the lock opened for navigation in 1913 and the project completed in 1914. On account of certain action taken by existing authorities of the State of New York, work on the lock and in the harbor of Troy has not yet been started.

40. *Canal terminals.*—Supplementary to the barge canal project, the State of New York has adopted a project providing for the expenditure of $19,800,000 for the construction of State-owned canal terminals. Specific localities for the more important terminals are designated by law, but the final decision as to their exact location and the preparation of the detailed plans are left substantially in the hands of the State Engineer. The project provides for the construction of canal terminals with modern appliances for the economical handling of freight at Buffalo, Tonawanda, Rochester, Lyons, Syracuse, Oswego, Utica, Rome, Lockport, Herkimer, Little Falls, Fort Plain, Canajoharie, and Schenectady on the line of the Erie Canal; at Plattsburg, Port Henry, Rouses Point, and Whitehall, N. Y., on Lake Champlain; and at Mechanicville, Troy, Albany, and New York on the Hudson River. It further provides for the construction of small terminals at a number of relatively unimportant localities to be determined by the canal board on the recommendation of the State engineer. The law adopting this project provides for the free use of the terminals by all parties and for operation at State expense and under State jurisdiction. Detailed plans for the terminals have not yet been approved.

41. *The city of Burlington, Vt.*—This city possesses an excellent deep-water harbor protected by a breakwater. The available water frontage is to-day mainly controlled by the railroads, but the city is now before the Commerce Commission of the State of Vermont with a plan to remove grade crossings, establish a new station, and secure to the city facilities for the development of a public lake terminal, to be constructed and operated at municipal or State expense.

42. *Municipal project, Albany.*—The common council of the city of Albany passed in 1908 an ordinance appropriating $300,000 for the improvement of the river front of the city. Of this amount $100,000 is now being spent in improving the pier at the foot of one of its principal thoroughfares, State Street. A new project, drawn up by the Albany Chamber of Commerce and backed by other commercial organizations and public sentiment generally has been adopted by the city council. This project provides for the general development of the city water front at an estimated cost of $1,092,000, and with the avowed object of securing under municipal control adequate, modern facilities for the most profitable commercial utilization of the river front for both rail and water transportation. The

chamber of commerce report on this project is appended hereto as inclosure E.[1]

43. *Municipal project, Troy.*—The citizens of Troy, through their chamber of commerce, have prepared a project for water front improvement, comprehending the ultimate utilization on an efficient and economical basis of the entire water front of the city to afford facilities for the development of water-borne commerce. The project involves a large expenditure which they plan to meet by issuing bonds as the work progresses. The project is now being held in abeyance pending definite and final action by the State officials on the location of and plans for the barge-canal terminals to be built at Troy by the State of New York.

44. *New York.*—The terminal facilities of the port of New York have been becoming more and more congested for a number of years. This condition has resulted in a diversion of commerce to other ports, and though the commerce of New York has been actually increasing, this increase is relatively less than the general increase in commerce seeking North Atlantic ports. Under the present administration, the city is fully alive to these conditions, and a project for a general revision of its docks and other terminal and transfer facilities is now under consideration with a view to its early adoption. As stated above, this subject will be given further consideration hereinafter. (See pars. 68 and 71.)

45. *Rate laws.*—There are now pending in the New York Legislature bills to regulate the operation of railroads within the State and among other things to enforce a just prorating and through rating on the canals and other waterways of the State. These laws and the canal terminal laws are considered of vital importance by the people of the State as measures necessary to insure them a full return on the capital invested in the construction of the new canals. The subject of railroad regulation with a view to fostering cooperation with water transportation is receiving careful attention from the Interstate Commerce Commission and the United States courts.

46. *Storage reservoirs.*—The State of New York has under consideration a project for the construction of extensive storage reservoirs in the headwaters of the Hudson River. These reservoirs are designed to increase the minimum flow in the river for water-power purposes, and to regulate the freshet heights for the benefit of navigation and the protection of riparian property; and it is hoped that they will enable the low-water discharge to be increased sufficiently to appreciably raise the plane of lowest water. Under this scheme it is proposed to commence work with the portion of the project providing for the construction of a large reservoir in the Sacandaga River. This reservoir is designed for a capacity of 29,000,000,000 cubic feet, and, according to statements of the Water Supply Commission of the State of New York, this should, by proper regulation, maintain a minimum discharge of 4,500 cubic feet per second over the dam in the Hudson at Troy. Under present conditions the discharge has fallen below 4,500 cubic feet per second on a total of 333 days during the past three years. However, the low-water elevation at and below Troy is influenced greatly by winds and other uncontrollable agents, and it is doubtful whether a relatively small increase in the volume of discharge would benefit navigation materially.

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[1] Not printed.

47. *Panama, Canadian, and intracoastal canals.*—The Panama Canal is scheduled to open in 1913, and so will probably make the connection between the Atlantic and Pacific systems before the opening of the New York State barge canals. The Canadians for a number of years have been considering the adoption of a project for a new canal to replace the Chambly Canal in the waterway via the Richelieu River which joins Lake Champlain with the St. Lawrence River. The Chambly Canal is 12 miles long, and affords a depth of 7 feet over the miter sills with locks large enough to accommodate boats carrying about 300 tons. A project for a 14-foot canal and river channel backed by the past premier, Sir Wilfred Laurier, probably would have been adopted had not interest in it waned during the recent agitation over the reciprocity question. Interest has lately revived, and it now seems probable that a project will be adopted in the near future. The intracoastal canal project has not been adopted by Congress, and the facilities which it will offer are not yet known. However, it will probably provide ultimately a waterway up and down the Atlantic coast which will be safely navigable by the barges operating the New York State canals, and will possibly be much utilized by deeper draft vessels engaged in the coastwise trade. Hence, the influence of this project on Hudson River commerce should not be overlooked.

IX. INFLUENCE OF PROJECTED IMPROVEMENTS.

48. *General.*—Physical changes which will be made by the above-described improvements can be predicted with some assertion of verity; but it is impossible to predict quantitatively and in specific terms the manner in which these changes will alter the existing commercial status of the Hudson River. The Atlantic and Pacific systems will be united; the new barge canals will multiply the carrying capacity of the lake-to-sea connection of the system; a new inland route paralleling the seaboard may greatly extend the zone of through operation of light-draft carriers; and throughout the Northeast terminal and transfer facilities will be greatly improved. All of these changes must result in a radical reduction in cost of transportation with a consequent increase in local traffic on the Hudson and a diversion of much rail carriage to the waterways on the entire Atlantic system. Reduction in cost of transportation should create new business; but the character and volume of this business will depend on many factors now indeterminate, including "personal equation" both of individuals and communities, and, hence, can be only conjectured. However, something of a qualitative analysis will be presented simply as a basis for deduction.

49. *Physical.*—Physical results accruing from the improvements which are now being carried on will be: The opening of a channel 12 feet deep and of sufficient dimensions for navigation by vessels of from 2,000 to 3,000 tons capacity from New York to Lake Champlain, Lake Ontario, and Lake Erie; an increase in the harbor room at Albany and Troy; greater length of usable water front in these cities, and a reduction in freshet currents and a decrease in the duration of the periods of extreme low water in the Hudson River.

50. *Local traffic.*—It can be expected that even without an increase in general business, local traffic in the Hudson will be augmented,

chiefly by reason of better transfer facilities, and to a lesser degree because of a reduction in loss of time and in operating expenses. However, should the changed conditions result in the establishment of new business, it is reasonable to suppose that the increase in local water-borne commerce would be marked.

51. *Barge canal traffic.*—The old Erie and Champlain Canals are capable of carrying about 9,000,000 tons per annum. As noted above, this limit was nearly reached in 1872, when these canals afforded the cheapest available route. Based on the time required for a lockage, the extreme capacity of one canal lock is computed as approximately 60,000,000 tons of bulk freight per annum. Allowing for delays, etc., the ultimate practical capacity of each of the canals will probably prove to be about 30,000,000 tons per annum. In 1906 two railroads competing with the old Erie Canal, the New York Central and Erie, carried on the divisions paralleling the canals 43,268,731 and 35,434,584 tons, respectively. These figures are taken from page 227 of the report of the inland waterways commission mentioned above. Between 1901 and 1906 the annual tonnage of the two railroads had increased by about 16,000,000 tons, or at a rate of about 5 per cent per annum. This increase does not seem to have been maintained, for the latest obtainable figures show that in 1909 these roads carried 40,894,086 tons and 32,000,752 tons, respectively. However, it is probable that they carried not less than 75,000,000 tons in 1911. In 1906 rates from Chicago to New York by water were $0.0644 per bushel and by rail $0.0698. In 1910 these rates were, respectively, $0.0563 and $0.0707. During the past year the average revenue per ton-mile received by the New York Central Railroad for the carriage of hay, grain, cotton, live stock, coal, lumber, etc., in carload lots was 6.18 mills. A careful estimate prepared in this office of cost of haul from Burlington to New York in self-propelled steel barges, especially adapted to the navigation of the barge canals, including interest on investment, depreciation, insurance, repairs, and overhead and operating expenses, shows a ton mileage cost of 1.35 mills. Various estimates prepared in connection with the design of the barge canals place the cost of haul at from 0.2 to 0.88 mills per ton mile. Mr. M. G. Barnes, consulting engineer for the State of New York, in a careful cost analysis just completed, estimates the cost of carriage of freight on the Hudson River in cars on car floats at from 3.8 to 5 mills per ton mile, depending upon whether or not the cars are fully loaded. (This report is appended hereto as inclosure F.) Making allowance for freight which by reason of its source and destination can not be handled economically by the waterway; noting that upward of 75,000,000 tons are now being handled annually by the Erie and New York Central Railroads, most of which is in direct competition with the Erie Canal, and that on through business to the West, the canal will compete with the Pennsylvania and other southern roads; having in mind the improvement in terminal facilities under way; allowing for additional tonnage from the Champlain Canal; and, above all, giving due weight to the difference between estimated cost of water haul and railroad revenues, it is believed that the commerce which will be brought to the Hudson by the New York canal system can be estimated conservatively at not less than 15,000,000 tons per annum. With eight months open to navigation and barges carrying

1,000 tons apiece, this commerce would require the passage of the upper Hudson by 1,900 barge loads per month, or 475 barge loads per week, or 68 barge loads every day. A shorter season would increase these figures; continuous, uniform operation over the entire system is not to be expected, and it seems probable that the river will be called upon freqeuently to handle the full daily capacity of the Troy Lock, which is 50 per cent greater than that of the canal locks. With three lockages per hour and only three boats to each lockage, the Troy Lock could pass 216 boats a day to be handled in the river. Much detailed information regarding railroad traffic can be found in the report of the Public Service Commission of the Second District of the State of New York for 1909.

52. *Panama Canal.*—Only one of the results expected from the opening of the Panama Canal will be mentioned. Albany was in the past the principal distributing point for lumber in the Northeast. Oregon and Washington lumber is to-day in great demand throughout this section and in the Middle West. Allowing one transshipment of cargo, it has been computed that Oregon lumber can be delivered in Chicago, by water via the Panama Canal, the Hudson River, the Erie Canal, and the Great Lakes, for from $8 to $12 per 1,000 feet board measure less than by rail across the Rockies. (See inclosure A.)

53. *The intracoastal canals.*—The interchange of commodities by water between the canal system of New York State and the principal Atlantic coast ports other than New York City requires transshipment. If the intracoastal canals are completed, this will not be necessary and these canals and the New York canals will become parts of the same system.

54. *Résumé.*—The above takes count of existing freight movements only and suggests changes of routes or a change from rail to water carriage, with reduced rates as the specific benefit derived, and the Hudson River as a link in all of the routes followed. A reduction in rates allows an increase in the sphere of competition of the manufacturing business affected. This usually results in an increase in business and entails an increase in the working population which is followed by an increased consumption of food products and demand for manufactured articles. All of these agencies augment the movement of commodities and hence involve a further increase in commerce, both rail and water. Everything considered, it is believed that the 40 miles of the Hudson River now under improvement are destined in the near future to support a more valuable commerce than will be carried by any other river in the United States.

X. PROBLEM IN HAND.

55. *Defined.*—It has been shown that while the Hudson River is an independent highway for a considerable local commerce, it is preeminently valuable as an indispensable connecting link in what may prove to be the most important of the through-water routes comprising the Atlantic waterways system. It has been shown also that projects are now under way which will greatly increase the capacity of this system, connect it with the Pacific system and reduce the cost of transportation upon it; and that other projects still under consideration seem destined in the near future to extend the inland mileage of the system, enlarge its sphere of usefulness, and further

increase its facilities for economical transportation. The problem in hand is to determine what increase in the depth of the Hudson River is demanded by the situation.

56. *Past discussion.*—Though not defined in these terms and under materially different conditions of development, this problem was discussed in 1891 by a board of engineers. The board was called upon by Congress to decide between two distinct propositions for improving the Hudson River. One was for deepening the river to an extent requisite for navigation by steam seagoing vessels; the other was a project for a depth limited specifically to 12 feet at mean low water. After a very thorough consideration, the board decided that the benefits to be derived from a channel for seagoing steamers were not sufficient to warrant the expenditure required; but that the existing and prospective commerce of the river fully justified the expenditure necessary to obtain a channel 12 feet deep at mean low water, involving a deepening of the river by about 2 feet. In its discussion of a channel for ocean-going vessels, the board of 1891 concluded that the amount of freight carried in ships having a draft greater than 20 feet was too insignificant to be considered in connection with the upper Hudson. In the investigation preliminary to the adoption of the existing project, the discussion of depth was limited by Congress to the question of determining the increase in channel depth required to give 12 feet of water at all stages of the river.

57. *Subjects for discussion specified.*—The wording of the act ordering the present examination does not name any specific increase in depth. It is thought that the importance of the through and local traffic has been shown to be sufficient to justify any expenditure required to give an increase in depth clearly shown to be necessary for the unhampered movement of traffic coming through the canals. Local interests have again presented a demand for a channel for seagoing vessels. Such a channel would make a radical change in the relations existing between the different elements of the Atlantic system; but the benefits to accrue are problematical, and it can be secured only at a relatively great cost. The problem, therefore, appears to resolve into two distinct questions; one, the determination of the adequacy of the 12-foot channel to be provided under the existing project to provide properly for the present and prospective traffic from the barge canals and for local traffic, with a special view to showing what increase in depth, if any, is required; the other, a discussion of the benefits to be derived from a channel for the navigation of seagoing vessels, in comparison with its cost. Since a channel for seagoing vessels will obviously give adequate facilities for barge canal and local traffic, its merits and cost will be discussed before taking up the adequacy of the 12-foot channel.

XI. CHANNEL FOR SEAGOING VESSELS.

58. *Outline of treatment.*—In order to have a standard for comparison with the benefits, it seems advisable to estimate the cost of securing a channel for seagoing vessels before discussing the benefits to be derived from it, and in estimating the cost, the first step is to decide upon the depth and width of the channel proposed. The benefits which will accrue are conceived to be of two classes: those result-

ing from the establishment in the capital district of a new transfer point for the transshipment to railroads or barges of commodities carried in seagoing vessels, and those to be derived from the creation of a new seaport in a locality especially adapted to the development of manufacturing, and at the same time the distributing center for a prosperous agricultural district.

59. *Depth.*—In 1891, 20 feet was decided upon as the greatest draft to be provided for. Since that date the tendency in the design of ocean-going steamers has been toward the utilization of deeper draft, and to-day the bulk of the over-sea carrying trade is done in ships drawing from 20 to 30 feet. Hence it is thought that a draft of at least 25 feet must be provided for at all stages, if the river is to be made navigable by seagoing vessels. This would require a minimum depth of 27 feet at lowest low water, which with the 3 feet tidal range prevailing, would open the river to all but the largest freighters. It has been noted above that a depth of 30 feet can be carried to Hudson except at two small bars.

60. *Width.*—The standard channel width to be provided under the present project is 400 feet. Whether this will prove sufficient for existing commerce is questioned. Great channel room in the Hudson is required to accommodate the tows which operate under existing conditions. These tows are made up of from 10 to 60 boats, 4 and 6 abreast, with a total width of 100 feet or more; and the largest river steamers are upward of 90 feet in beam. The tows are exceedingly unwieldy and for safe handling should have twice as much channel room as their width. As suggested above, traffic is likely to become more congested rather than less, and ocean steamers will be only less unwieldy than the tows and are far more valuable. Hence, a least width of 600 feet as far north as practicable is considered necessary for safe navigation. North of Van Wies Point, 4 miles below Albany, a uniform width greater than 400 feet may not be practicable.

61. *Cost.*—Based on unit prices obtained on barge canal work, a project for a channel 27 feet deep at lowest low water and 600 feet wide through the bars below Hudson and from Hudson to Van Wies Point and 400 feet wide from there to Albany has been estimated to cost, under most favorable conditions, about $10,000,000 in excess of the cost of the present project. To extend this channel to Troy with a width of 300 feet would cost about $8,000,000 more. These estimates are considered a minimum and to allow for unforeseen difficulties and contingencies $12,000,000 and $10,000,000, respectively (or $22,000,000 from deep water to Troy), are more conservative.

62. *Benefits, two classes.*—It is conceived, as stated above, that the benefits which would be derived from opening the upper Hudson to navigation by seagoing vessels can be grouped conveniently into two predominant classes: First, those resulting from the establishment in the capital district of an additional point for the transfer of commodities between seagoing vessels on the one hand and barges and railroads on the other; and, second, those resulting from the establishment of a new seaport at the natural distributing center of a district at present partially developed but with great resources and so located as to be peculiarly well adapted to manufacturing. The benefits of the first class pertain essentially to the through movement of freight between the seaboard and the interior, and those of the second class pertain to the local development of northeastern New York

63. *Transfer point, data on tonnage.*—To-day though far the greater part of the over-sea and coastwise tonnage passing to the interior by routes competing with the New York canals is transferred at New York City, complete statistics of the commerce of the port of New York are not available. The United States custom service furnishes an accurate record of the foreign tonnage; the Department of Commerce and Labor reports in its monthly "Summary of Commerce and Finance of the United States," the total movement of various commodities, both by rail and water; the Jamaica Bay Improvement Commission, in its report submitted in 1907 and printed in House Document No. 1506, Sixtieth Congress, second session, estimated the coastwise and interior commerce of New York and probable rates of increase; estimates of coastwise tonnage were presented by the committee on traffic of the proposed intracoastal canal connecting New York and Delaware Bays in connection with the intracoastal canal project; and much detailed information regarding river, canal, and railroad tonnage is tabulated in the preliminary report of the inland waterways commission submitted in 1908. From these sources of data an estimate will be deduced of the present tonnage transshipped in New York and its probable increase.

64. *Transfer point, present tonnage to interior.*—Statistics carefully compiled shortly after 1899 show that in that year the commerce of the port of New York was made up as follows:

	Tons.
Foreign commerce	15,201,000
Coastwise commerce	39,250,000
Commerce to and from the interior	25,093,000
Total	79,544,000

Commerce to and from the interior includes all transshipments, and if a reliable estimate can be made of the volume of this commerce in late years, further analysis should produce a figure indicative of the value of commerce transferred. The ratio between foreign, coastwise, and interior commerce in 1899 was nearly 3:8:5. The foreign commerce in 1910 was 26,800,000 tons. If the above ratio still obtained, the coastwise commerce in 1910 should have been about 71,500,000 tons and the interior commerce about 45,000,000 tons. But the relation existing between these three classes of commerce appears to have changed since 1899. Figures tabulated by the Department of Commerce and Labor show that in 1910, the following quantities of specified commodities were carried in the coastwise traffic entering and clearing at the port of New York:

	Tons.
Coal	26,325,000
Grain	1,200,000
Lumber	2,100,000
Cattle	81,000
Miscellaneous merchandise	6,600,000
Fruit	94,000
Total	36,400,000

Adding 50 per cent for commodities and shipments not included in the above table, the total coastwise traffic in 1910 would appear to be about 54,600,000 tons. From a study of the recorded increase in foreign traffic and of the conditions affecting the coastwise traffic, the Jamaica Bay Improvement Commission estimated the probable increase in coastwise traffic to be about 1,177,000 tons per year. If this estimate was correct and the coastwise traffic in 1899 was 39,250,000 tons as stated above, it should have amounted in 1910 to about 52,000,000 tons. It will be noted that this estimate agrees fairly well with the one just given. A similar rate of increase in the interior tonnage would show an advance from 25,100,000 tons in 1899 to about 33,000,000 in 1910. It is evident that the foreign commerce has increased more rapidly than the coastwise commerce, and it is presumable that a greater portion of the interior commerce is derived from the former than from the latter. Consequently it is believed that 37,000,000 tons is a fair figure for the present commerce to the interior.

65. *Transfer point, present tonnage transshipped.*—The value of a transfer point as such depends upon the quantity of material which is transferred without change in character, and does not take count of that which undergoes a manufacturing process or passes through the hands of middle men, since these two operations are functions of commercial advantages other than facilities for the direct transfer from ships to cars or barges. Considering the Erie Canal traffic as typical of the character of bulk freight passing to and from the interior, knowing that about 50 per cent of the Erie Canal traffic is transshipped directly at New York, and assuming that the commerce to the interior is not less than 37,000,000 tons as estimated in the last paragraph, at least 30,000,000 tons of which are in bulk commodities, it is believed that 15,000,000 tons is a conservative estimate of the commerce transshipped at New York in 1910. Probably 75 per cent of the amount is destined for or comes from points reached through the New York State canal system.

66. *Transfer point, estimate of future tonnage.*—An analysis is given in the report of the Jamaica Bay Improvement Commission showing that in all probability the commerce of the city of New York will continue under existing conditions to increase at a rate between one and two million tons per annum. Presumably, then, the tonnage passing through the port to and from the interior will also increase. It is thought, however, that the opening of the new Erie Canal will alter conditions so as to augment this increase radically by making New York the most economical point of shipment for much of the grain now leaving the United States from other ports. Since the cost of transportation is a determining factor in the annual output of grain from the United States, it is presumable that a decrease in the cost of transportation including transfer charges will result not only in a change of route, but also in an enlarged output. Among other commodities that will be affected materially by the opening of the projected and proposed water routes are iron ore, coal, salt, lumber, building materials, etc. Hence it seems inevitable that a great increase in commerce is destined to be realized, but whether this increase demands the establishment of a new transfer point or whether its amount would be affected greatly by it can only be conjectured.

67. *Characteristics essential to a good transfer point.*—The essential characteristics of a good point for transfer between seagoing vessels and railroads differ somewhat from those essential for transfer between seagoing vessels and barges. The new transfer point in question should fulfill both of these functions. One feature essential to both is an adequate harbor with practicable access to the sea. For

transfer to railroads a railroad center has decided advantages, which are increased if the transfer point be also a terminal or division point of the more important railroads. Space should be available for the construction of docks connected with each other and with all the railroads by a belt line. Lighterage or car-float transfer should not ordinarily be necessary. For transfer between ships and barges, railroad communication is not essential; the transfer point should be so located that the total cost of haul, other things being equal, is a minimum, and the character and volume of the commerce must be such that shipments may be made in cargo lots, as otherwise an isolated transfer point loses its value as compared with a great port to which many lines converge. For example, a vessel leaving New York with a miscellaneous cargo only part of which is brought to it by boat, could not be expected to travel any distance for the receipt of this increment.

68. *New York as a transfer point.*—With the exception of convenient intercommunication between railroads and wharves, all of the essential characteristics named above for transfer to both railroads and barges are possessed by the city of New York. Over-sea shipments are handled along a water front more than 50 miles long. This water front is served at isolated points by the various railroads, but the bulk of transferring is now accomplished by car floats and trucking at a figure so high that were it not for other financial and industrial advantages inherent in its position as the commercial center of the United States, New York would cease to hold its supremacy as a seaport. The commercial interests of New York are realizing this and important changes are in contemplation.

69. *The capital district as a transfer point.*—The capital district is located at the confluence of the barge canals and on the line of one of the two greatest railroad systems entering New York, the New York Central & Hudson River. It is the meeting point of other railroads, as described in paragraph 21, and as a location for a freight terminal for the New York Central system it possesses physical advantages far greater than those of New York. Between Albany and New York the railroad is now taxed to its utmost and, passing for much of the way on an expensive side cut between rock cliffs and the river, increased capacity can be obtained economically only by the construction of new lines through the back country, lacking the excellent grade supplied by the river. Railroad expansion north and west of Albany can be obtained at a far lower figure and practically without limit as to advantageous location. In the lowlands lying between Van Wies Point, about 4 miles below Albany and Troy, there are on both sides of the river about 10 miles of undeveloped water front readily adaptable to the economical construction of railroad terminals with water connection. For example, about 4½ square miles of alluvial land lies between the existing railroad tracks and the river between Troy and Albany, with another suitable tract on the west bank just south of Albany. This land is flat and, though subject to overflow at high stages, could by a process of hydraulic dredging and fill be converted economically into freight yards and deep-water slips. Thus the capital district possesses facilities for the construction of a harbor with adequate rail connections, but connection with the sea requires 150 miles of inland navigation. The lower 120 miles have a natural channel of great depth and ample width, but tortuous and

subject to dense fogs in the summer and closed to navigation by ice in the winter. The upper 30 miles must be an artificial channel, everywhere tortuous, and with limiting dimensions described in paragraph 9. It is believed that grain, lumber, and possibly iron ore would reach this district in cargo lots. Whether these cargo lots would arrive with sufficient frequency to justify the establishment of a transfer point is doubtful. With regard to the location of the capital district in respect to total cost of haul, there should be for rail and water shipments a reduction equal to the difference between cost of haul by rail and cost of haul in seagoing vessels from Albany to New York. The estimated cost of haul per ton-mile in barges of from 1,000 to 2,000 tons capacity has been given above. Mr. M. G. Barnes, consulting engineer for the State of New York, has estimated the cost of haul on a seagoing ship at 1.272 mills per ton-mile. (See inclosure A.) It is thought that Mr. Barnes's estimate is too low, but whether or not this is the case, it is believed that the determining factor in total cost of through transportation by water will be terminal and transfer charges rather than ton-mile cost.

70. *Transfer point, summary of benefits.*—The volume of commerce transferred in New York has been shown to be great and growing. The establishment of a transfer point in the capital district can be looked to relieve congestion of traffic in New York. It would probably result in a slight decrease in the cost of haul by water and rail to the North and West, and would facilitate the rehandling of bulk commodities.

71. *Transfer point, contrary considerations.*—The city of New York has for a long time been giving very careful study to the question of establishing transfer points in its immediate vicinity. Many advantageous locations are available. A beginning will be made under the present State project for the establishment of barge canal terminals; and the Bush Terminal in Brooklyn furnishes a most successful precedent now in operation. One or more of these terminal projects is almost sure to be undertaken in the near future; and the city has long had under consideration and must shortly bring to adoption in cooperation with the New York Central Railroad a project for water-front improvement on the island of Manhattan which will greatly relieve the present local situation. In short, the congestion referred to as a chief reason for establishing a new transfer point is destined, in some measure at least, to be relieved in the near future. With respect to cost of haul, fullest economy of carriage in seagoing vessels can be secured only when full cargoes are assured with no appreciable delay in obtaining them; and a strong impression exists that in all but exceptional cases, the relatively inexpensive and simple barge of medium draft is a cheaper carrier than the large steamer whose design and equipment are more complicated and expensive for the sole purpose of enabling her to resist the much severer conditions of deep-sea navigation. Hence, other things being equal, the most economical point for transfer from ocean to inland vessel would seem to be on the seaboard.

72. *Other sites for transfer point.*—In addition to the probable expansion of the terminal facilities in the city of New York, it should be noted that a large number of sites for transfer points exist along the deep portion of the Hudson River possessing all the advantages of the capital district, except that they are not to-day important

centers and division points of railroads and, with the exception of the city of Yonkers, are not to be compared in population or business with the capital district. It is thought that these two considerations, namely, existing business and population, are the only reasons why a transfer point was not established on the lower Hudson in the past, as soon as the creation of one had become an economic necessity. The reach of the river between Newburgh and Poughkeepsie possesses nearly all the advantages for rail connection to the north, east, and west, as does the capital district. All the roads which have terminals in the capital district have direct connections here with the exception of the Delaware & Hudson, and the Newburgh district is reached by the Erie, the Ontario & Western, and the New York, New Haven & Hartford Railroads, which roads do not touch the capital city district. From the mouth to the Newburgh district, the Hudson is navigable for vessels of the largest size, and the distance from the mouth to this district by water is less than half the distance from the mouth to the capital district. No further improvement of the river is required to permit, in the Newburgh district, the transshipment of goods between railroads or barges and deep seagoing vessels. Despite these facts, there has been practically no development of this district for such transshipments. Therefore, it must be inferred that there has been no good economic reason for such a development.

73. *Local seaport.*—The second class of benefits, namely, those to be derived from the creation of a seaport in the capital district, allows a somewhat more simple discussion. This district may be considered, first, as a receiving and distributing center for the surrounding country and, second, as a manufacturing district.

74. *Receiving and distributing center—Lumber.*—During the palmy days of the Erie Canal, Albany was one of the greatest lumber markets in the United States. The lumber came chiefly from the Great Lakes, New York State, and Canada, and was shipped to consumers in New York City and elsewhere, passing through the hands of middlemen in Albany. During the decline of the Erie Canal a change in practice regarding the handling of lumber took place. The consumers in New York bought more and more from the mills direct, and the lumber was shipped through to its ultimate destination without transshipment and without passing through the hands of middlemen. At the same time the supply of Canadian and northeastern lumber has been falling off, its place being taken by southern and western lumber. To-day Albany and Troy are essentially local lumber markets receiving Canadian and Michigan lumber by canal and rail and southern lumber by river, mostly for local distribution. In 1911 about 42,000,000 feet board measure were received in Albany by water and about 15,000,000 feet by rail, and in Troy about 9,600,000 feet were received by water and about 8,400,000 feet by rail. It is contended by some that if a channel for seagoing vessels is secured, the capital district would again become a great general lumber market, Oregon and Washington lumber coming via the Panama Canal and the ocean, and Georgia and Mississippi lumber by sea for local distribution throughout New York State, and Canadian and Michigan lumber coming by the canals for shipment in seagoing vessels abroad and to the Atlantic coast ports. It has been estimated that 1,030,000,000 feet would

be handled yearly in this business. With the probable reduction in railroad freight rates on Pacific coast lumber, in competition with the Panama Canal route, and the established ocean traffic in Canadian lumber through the port of Montreal, it is believed that the above estimate is unreliable. Excepting for its lumber business, the capital district is important to-day because of its manufacturing business rather than as a distributing center, and the establishment of warehouses in connection with the barge canal terminals in this district would furnish facilities for accumulating cargoes for outward-bound steamers and for storing the inward-bound freight for subsequent distribution. It is not anticipated that such business is likely to become important. The surrounding country is too near New York to need a large intermediate distributing center.

75. *Manufacturing.*—With excellent transportation facilities for the handling of both raw materials and the finished products, with a location central and convenient to New York, Boston, Montreal, and the rich valleys of the Mohawk and Lake Champlain, and with abundant water power within economical distance for electrical transmission, the capital district has practically all of the essential qualifications for the successful development of manufacturing. Coal is obtained from Pennsylvania, chiefly by rail. Pulp wood is brought in great quantities from the Adirondack region and from Canada. Very extensive deposits of excellent iron ore are being mined on Lake Champlain, and molding sand and the ingredients of Portland cement are obtainable in quantity along the banks of the Hudson. With such natural advantages and many excellent available factory sites, it would seem that only a realization of its possibilities and a reduction in freight rates are needed to foster the development of a much larger manufacturing business than now exists. A reduction in freight rates will follow the opening of the barge canals, and hence it would seem wise to await the effect of this change in conditions upon the manufacturing business before deciding whether its future development hinges on the creation of a seaport for its use.

76. *Inland navigation by seagoing vessels.*—As pertinent to both functions of the deep water channel, attention is invited to the dangers and difficulties operating to discourage seagoing ships from making long inland trips. They must operate at greatly reduced speed and with constant danger of risking the relatively great capital which they represent not only to possible total loss but to frequent inactivity as the result of running aground. They are also a constant source of danger and inconvenience to other craft. It is noted, however, that in spite of somewhat similar conditions the St. Marys Falls Canal carries to-day the greatest tonnage in seagoing vessels in the world, and that ships sail inland some 80 miles to the port of Hamburg through a restricted and tortuous channel, which shows that where the economic necessity exists or other inducement is sufficient, inland navigation by seagoing vessels is practicable. That the Hudson River in the future may offer such inducements is thought to be not in the least improbable; that their existence to-day has been demonstrated is doubtful.

77. *Summation.*—It has been shown that the capital district has all the qualifications for a good transfer point except ready access to the sea, that it has great natural advantages for the development

of manufacturing business, and that radical improvement in its transportation facilities is now nearing completion. The question to be decided is the necessity for incorporating in this improvement an expensive project for opening the river to seagoing navigation. It has been further shown that although the Newburgh district, lying at less than half the distance from the sea than the capital district, possesses a possibility at small expense of making a transfer point between seagoing and inland commerce, no attempt has been made to take advantage of this, probably for the reason that the economic necessity for such a transfer point does not exist. Conceding that the opening of a deep channel in the upper Hudson would assist in developing manufacturing business and would to some extent relieve present congestion in New York Harbor, but considering that new transfer facilities are shortly to be created in New York, that the opening of the barge canals will so alter transportation conditions as to furnish a reliable indication as to whether or not business intends to profit by the manufacturing facilities offered, and that successful inland navigation by seagoing vessels is at best uncertain and always attended by great difficulties, it is thought that the present necessity for the creation of a ship channel in the upper Hudson at a cost in excess of $10,000,000 has not been fully proved.

XII. CHANNEL FOR VESSELS DESIGNED FOR NAVIGATION OF INLAND WATERWAYS.

78. *General.*—It is thought that the commercial importance of the Atlantic waterways system is fully appreciated, but special emphasis is placed upon the importance of the Hudson River as a connecting link in this system and upon the fact that with the exception of its upper 30 miles the Hudson needs practically no improvement to accommodate the deepest draft freight vessels in the world. The barge canals will represent an investment of approximately $120,000,000. This figure can be taken fairly as the measure of the benefits anticipated from the ocean to lakes connection of the Atlantic system. Hence, it is believed that the improvement of the Hudson River to any extent clearly shown to be necessary in the interest of barge canal and other through traffic needs no further consideration in relation to the pecuniary value of the commerce to be benefited; in other words, the problem resolves itself into the determination of the extent of improvement necessary in the interests of that traffic. Therefore, assuming that most of the bulk freight to be shipped via the river will be carried in vessels of a type which can navigate the barge canals, the first question which arises is the adequacy of the projected channel 12 feet deep at lowest low water to meet fully the just requirements of the present and prospective commerce. While the vessels navigating the barge canals constitute a determining factor in formulating channel requirements, the local traffic must be given due consideration, not only on account of its intrinsic value, but because it must be allowed to operate without unduly hampering the movement of through traffic.

79. *Depth, barge canal standard.*—A depth of 12 feet having been adopted for the barge canals, it would seem at first sight adequate for the river connection. But the conditions of navigation in the

natural channel of a river differ widely from those of a sheltered, currentless canal, and safety requires that the natural channel shall be both deeper and wider than the artificial waterway. As shown hereinafter, a restricted width and depth of channel results in low speeds and a relatively high expenditure of power. If in a through route the depth and width of channel can be increased in a portion to an extent which will make a saving to commerce when traversing that portion greater than the interest on the cost required for the work, the necessary expenditure is justified, and the time and cost of navigating the entire route are decreased.

80. *Existing project.*—As a project is now in force for the improvement of the Hudson, it may seem unwise to make any radical changes until results can prove the efficiency of the channel contemplated under this project. But if slightly greater depth is to become necessary in the near future, it would be uneconomical to obtain the full depth under two successive projects as compared with doing the whole work under a revision of the existing project. The work under the existing project is only just started, and any revision deemed advisable should be made as soon as possible. If the project were revised at this time to provide for greater draft, the only work which would have to be relet or done in piecemeal fashion is the work of rock removal. In other respects the present project could be adapted readily to greater depth with material changes only in the estimates of costs; and it seems probable that the existing contract for rock removal might be modified or supplemented to provide for deeper excavation on terms mutually satisfactory to the contractor and to the United States.

81. *Vessels.*—In determining the extent of improvement required, the type of vessel to be accommodated must be fixed as an hypothesis. The barge-canal locks with a depth of 12 feet over the miter sills are designed for vessels drawing 10 feet when fully loaded, and the largest of the river steamers which have been designed especially for navigation in the upper Hudson have a load draft of 10 feet when not in motion. To be sure if greater draft were given, vessels now operating elsewhere would be brought into the Hudson in competition with the existing fleet of steamers which were especially designed for this navigation. But if the channel, of whatever depth, is designed expressly for navigation by vessels drawing 10 feet, it is presumable that in the future new ships built for this particular service will not be given increased draft. The ease with regard to the fleet of towboats which may be expected to handle the barge traffic is somewhat different. The pecuniary efficiency of the towboats increases within limits with their draft. Paddle-wheel towboats have become obsolete, and the present tendency is to concentrate more and more power in large, deep-draft, single-screw steamers. At present the Cornell Towing Co. operates the majority of the tugs on the river, and has adopted the policy of handling traffic in the largest possible tows with tugs of steadily increasing dimensions and power. There are now in service a number of tugs which, when pulling at their maximum efficiency, draw 14 feet or more, and these tugs are invariably brought up the river in place of the lighter draft tugs when, during freshets, there is sufficient depth to accommodate them. However, when pulling a heavy load, these tugs do not create damaging swells and can operate safely and satisfactorily with less water under their keels than can the big

steamers. The steamboat traffic being of less importance than the canal traffic, no marked development in steamboat design need be provided for. In the following study of channel cross section it will be assumed that the river is to be adapted to navigation, first, by barges from 150 to 300 feet long of 25 to 40 feet beam and draft loaded of 10 feet; second, by towboats drawing 14 feet or less; and, third, by steamers not over 500 feet long, with beam over the guards of 90 feet, beam of hull 60 feet, and a load draft at rest of 10 feet.

82. *Requirements.*—Having decided on the type of vessels to be accommodated, the channel should be designed for safe navigation, economy in consumption of power, and a minimum cost of maintenance, and, as far as is consistent with these, for the best practicable speed which will not create swells unduly damaging to the shore line or to passing craft and craft moored along the banks.

83. *Minimum clearance for safety.*—Navigation is possible wherever the depth of channel exceeds the draft of the vessel in motion. As affected by the depth, navigation is safe only where the channel is at all times free from obstructions rising above the general level of its bottom, or where the depth is such that there is sufficient clearance between the bottom of the moving vessel and the channel bottom to enable her to pass over any obstruction whose presence is not definitely known and which therefore can not be avoided. The nonexistence of obstructions can be assured only in channels which are continually watched, and is practically attainable only in very restricted waterways such as the entrances to important locks; while sufficient clearance to avoid all possible obstructions can seldom be secured in artificial channels except at prohibitive cost. Hence, a compromise must be made, based on the character of obstructions likely to be encountered, and the nature and volume of the commerce. Under the conditions obtaining in the Hudson River it is thought that reasonable safety required that the clearance be such that obstructions whose presence is known to be probable will be passed over. Such obstructions are building stone or barrels of cement dropped from the decks of barges, snags brought down by the freshets, pieces of wreckage, lost anchors, etc., and the condition of the bottoms of most of the steamers and bills for repairs on the books of the navigation companies bear evidence of the frequency of their occurrence. Great stress is laid on this phase of the question by the officials of the Hudson River Day Line. Where freight-carrying vessels are forced for other reasons to run at very slow speed in a carefully watched channel such as that of a canal, the risk involved in operating with little or no clearance may not be sufficient to justify the expense of obtaining a deeper channel. In the Hudson River effective precautions can not be taken against the creation of small obstructions, while the river is navigated by both freight carriers and large passenger steamers, making the danger from hitting small obstructions too great and the results too disastrous to justify operation without an adequate clearance. While the existence of obstructions is at present evidenced chiefly by the guarded slow running in the shoal reaches of the river, the liability of serious disasters from this cause is always present, and must increase in a geometrical ratio with the increase in traffic, there being more vessels to create obstructions and more to hit them. Considering the character of most of the obstructions encountered and the volume and character of traffic anticipated, it is believed that the

minimum clearance allowable for safe navigation in the Hudson River is 2 feet. • In Germany the clearance adopted as safe is 1 meter (39 inches).

84. *Relations between factors in channel design.*—It is a matter of common knowledge that a vessel in motion apparently draws more water than when at rest; that this increase in draft is greater in shoal water than in deep water and that for a given speed, more power is required in shoal water than in deep water. The increase in draft referred to is commonly known among boatmen as "squat." While the existence of these phenomena is well known, there is either an absence of knowledge or a great diversity of opinion with regard to the exact relations obtaining between them. These relations are of vital importance in the determination of proper channel depth, since they affect directly the clearance, power consumption, cost of channel maintenance, and speed; and for this reason it has been attempted to demonstrate, at least approximately, the relations existing between draft, speed, power, and channel cross section under the local conditions prevailing on the upper Hudson. A study has been made of past researches along this line and observations were taken on vessels in actual operation.

85. Details of the information obtained and of the results of the observations made are given in inclosure G to this report. The most important deductions are as follows:

(*a*) The squat of a given boat underway is a function of the channel depth and of the speed of the boat. For channels varying in depth from 12 to 16 feet the squat decreases as the depth increases. The curves deduced show the following relations (pl. 5 of inclosure G):

	Channel depths.			
	12 to 13 feet.	13 to 14 feet.	14 to 15 feet.	15 to 16 feet.
	Feet.	*Feet.*	*Feet.*	*Feet.*
Speed 8 miles per hour, squat	1.4	1.2	1	0.9
Speed 10 miles per hour, squat	2.25	1.9	1.5	1.4

In the observed case of the paddle-wheel steamer *Hendrick Hudson*, 400 feet long, 45 feet beam of hull, and with normal draft of 9½ to 10 feet, when moving in water 135 feet deep at a speed of 22.5 miles per hour, the squat was 0.99 foot. In the same depth at 11.5 miles per hour the squat was 0.15 foot. In water 14.4 feet deep at a speed of 9.14 miles per hour the squat was 1 foot. In water of practically the same depth the greatest speed she could make was 9.48 miles per hour and the squat was 3.25 feet.

(*b*) As might be deduced from the above, the squat at any depth is a function of the power consumed. For a given boat in a given depth of from 12 to 16 feet the squat increases rapidly under the exertion of from 0 to 250 horsepower and more slowly after that power is reached. Here again the squat is shown greatest for the least depth. (See inclosure G.)

(*c*) The relation of power to speed in varying depths for a given boat of 7 feet 6 inches draft is shown by the curves of plate 2 of inclosure G, the relative increase of power required being the greater in the lesser depths. For example, to attain a speed of 8 miles per hour in depths varying from 12 to 20 feet, the power required will vary from 250 to 125 horsepower. To attain a speed of 10 miles per hour, the power runs from 700 to 300 horsepower. In other words, for the given boat moving in 12 feet of water the expenditure of 225 horsepower will give her a speed of 8 miles per hour; while to attain a speed of 10 miles per hour 700 horsepower must be exerted. In 20 feet of water the same boat would have a speed of 9.4 miles per hour with the expenditure of 225 horsepower and of 12.4 miles per hour for 700 horsepower.

In the case of the *Hendrick Hudson,* previously cited, in about 14 feet of water she exerted 350 horsepower in attaining the speed of 9.1 miles per hour and 730 horsepower for a speed of 9.48 miles per hour.

(*d*) For a given boat the swells produced were a function of the depth and speed, and the destructive effect a function of the channel width.

In 135 feet of water, at a speed of 22.5 miles, the swell produced by the *Hendrick Hudson* was about 1 foot and was inappreciable at a distance of 1,000 feet.

At Bogart Island near Albany, in a width of 770 feet and a channel depth of 12 feet, while running at a rate of 11 miles per hour, the swell raised at the shore was 5.5 feet from hollow to crest.

86. *Specific deductions.*—A study of the curves and of inclosure G will lead to the following conclusions for vessels of the class found in the Hudson River:

1. That in 12 feet of water safe clearance can not be maintained.
2. That in 13 feet of water safe clearance can be maintained with a speed less than 8 miles per hour.
3. That in 14 feet safe clearance can be maintained with a speed of 10½ miles per hour, but that at this speed the power consumption will be uneconomical and the swells damaging.
4. That in 16 feet a speed of 12 miles per hour can be maintained safely and economically.
5. That speeds greater than 14 miles per hour are uneconomical or unattainable except in very deep water.

The large steamers of the Day Line are designed to operate economically at a speed of 20 miles per hour in deep water. They are scheduled to make the run from New York to Albany as a daylight trip in about 10 hours, and the volume of their through business depends largely on the time element. At present the average speed of both day and night boats north of Hudson is from 7 to 12 miles per hour. The night boats are designed for an economical speed of 15 miles per hour. As they make no stops between Albany and New York, the question of speed is not so important to them as to the Day Line. The most important benefits to be gained by an increase in depth would be for the day boats greater speed and for both day and night boats economy in power and a safe clearance.

87. *Barge traffic.*—With respect to freight traffic, two elements are of particular importance—the draft of towboats and resistance to motion of barges either self-propelled or under tow. The volume of the prospective traffic to and from the barge canals has been estimated at 15,000,000 tons per annum (see par. 51). The local tonnage and that transferred by rail amounted to about 3,700,000 tons in

1910 (see par. 24). Making due allowance of the business of the passenger steamers, a very conservative rate of increase would place the probable total barge traffic on the river at about 20,000,000 tons per annum. This would require 20,000 cargoes per annum, if the average cargo is 1,000 tons.

88. Experience has shown that from 13 to 15 feet is the most economical draft for towboats of the type used on the lower Hudson and in New York Harbor. As noted above, shallower draft boats are now in use on the upper Hudson for heavy work because only of lack of channel depth now and in the past. At slow speed when pulling, the propeller tugs do not squat appreciably. Hence, with 16 feet of water, a 14-foot tug can maintain a 2-foot clearance, while to a far greater degree than in the case of passenger or freight carriers the slow-moving, relatively small, stoutly built tug can operate on less clearance with comparative safety. Based on the best boats now in service on the Hudson, the following seems to be the limiting indicated horsepowers practicable for various draft tugs:

Draft.	Indicated horsepower.
6 to 8 feet	150- 300
8.5 to 10 feet	500- 800
13 to 15 feet	1,000-1,800

With equal indicated horsepowers the pulling power generally increases with the draft. The smallest tugs in service are operated with a crew of 9 men and the largest with a crew of 12 men. For a given total pulling power, however, the coal consumption varies more nearly with the total horsepower required, however distributed between tugs. The cost of wages and repairs is more nearly a function of the number of boats. These figures give some idea of the economy in using deep-draft boats.

89. Investigations were made in the variations of towline tensions at speeds of 4, 6, and 8 miles per hour for depths varying from 12 to 16 feet for the power required to give this pull and the coal consumption involved. A report on this subject is found in inclosure G. The results, as found by Lieut. Black for the conditions prevailing on the upper Hudson, may be summed up as follows:

(*a*) For a given tow the tension on the line, the power required to develop this pull, and the coal consumed in producing the power are increasing functions of the speed and decreasing functions of the channel depth.

(*b*) As a consequence the number of barges which can be pulled by a given boat decrease when the speed required is increased, and increase when the channel depth increases.

For example, it is estimated that the power required to pull three barges at a rate of 4 miles an hour in a channel depth of 12 feet would pull five barges at the same speed in a channel 14 feet deep and six barges in a channel 16 feet deep.

It is estimated that in hauling these barges from Troy to Hudson, a tug using her full power would consume 2 tons less coal in a 14-foot channel than in a 12-foot channel.

The economic value of channel deepening is apparent.

90. The above deductions are based on assumptions which are not fully substantiated and formulæ which are not strictly applicable to the conditions. However, the results are consistent with actual practice as far as ascertainable. From the records of the largest towing company on the river it appears that the average coal consumption between Albany and Hudson is 33 per cent of the total between Albany and New York, while the distance from Albany to Hudson is about 30 miles and from there to New York about 120 miles. The towing time between Hudson and New York is from 24 to 30 hours and between Albany and Hudson from 7 to 12 hours. During high water the tug *Pocahontas* (one of the most powerful in service with normal draft of 13 feet), with a load of about 25 canal boats, takes about 4 hours to run 14 miles from Albany to New Baltimore with a depth of from 12 to 14 feet, and 2 hours to run from there to Four Mile Point (12 miles) with a depth of from 15 to 17 feet, but including a few bad shoals. The tug *Murray*, of about 300 indicated horsepower, made during the last year 107 round trips between Albany and New York towing one large barge drawing 9 feet. From his actual observation, her engineer computes that a difference in depth of 2 feet, resulting from tide or freshet, effects an average saving of one-half ton of coal between Albany and New Baltimore.

91. *Channel maintenance.*—One of the most potent sources of disturbance to the channel of the Hudson is the formation of ice dams. These ice dams are usually the result of a freshet caused by a sudden thaw. An increase in channel cross section will provide a greater run-off in the tidal section of the river and it is thought may reduce the tendency for the formation of these dams. Experience, however, during the past has not been entirely in favor of this deduction, for though the cross section of the channel has been increased by the dredging, ice dams still form when the ice moves out without being weakened by a thaw and forms a dam at points where there is no indication of any obstruction. It is thought that by building the dikes higher and retaining the water in the channel where it now by a "side draft" loses considerable volume, the formation of ice dams may be rendered less frequent and eventually be prevented. However, experience shows that frequently bars of 2 or 3 feet height are formed when the ice leaves the river and within a month or so thereafter are often smoothed out by the action of the currents. With a normal clearance of several feet, it will be seen that steamers and tows can be floated safely over these bars at reduced speed until the bars are removed by nature. With a less depth it becomes necessary each year to dredge these bars under small and expensive contracts. During the past 15 years about $20,000 would have been saved could the necessity for removing these temporary obstructions to navigation have been avoided.

92. *Swells.*—It has not been practicable to obtain exact relations existing between the size of steamboat swells and channel depth for various speeds, though some fragmentary information regarding them will be found in inclosure G. The water elevations recorded therein were taken with an automatic tide gauge, and it is doubtful whether the instrument was sensitive enough to record the rapid oscillation of the waves. It is known, however, that next to ice jams these swells are the most destructive agents to the dikes and shore revetments.

Further than this, they are a source of constant danger to shipping tied up along the shore, and by requiring repeated slow downs they add greatly to the cost of operating the steamers, in addition to giving grounds frequently for claims for damages. In deep water near West Point the Day Line steamers running 20 miles an hour throw swells less than 1 foot in height. At Bogart Island near Albany, where the depth of water was about 12 feet, the steamer *Hendrick Hudson*, running at 11 miles an hour, threw a swell that completely deluged the party taking observations from the top of a dike 4 feet above the water level. The question of the steamboat swells is a serious one to-day, and its importance will increase more rapidly with greater congestion of traffic.

93. *Clearance—suction.*—A peculiar result of operating steamers with a clearance less than 4 feet is seen in a strong lateral force in the neighborhood of a moving vessel called the "suction." This tends to draw a smaller vessel against a larger one, and to cause any vessel to shear abruptly away from the side of a shoal, often aggravating the danger of collision. A number of serious accidents have been caused in the past in this manner, and "suction" greatly increases the difficulty and danger in passing.

94. *Summation.*—All the above deductions point to the conclusion that a depth of 16 feet should be provided to give facilities fully adequate to the unhampered use of the river in its function as an important element of the Atlantic system. However, it has been shown that with a depth of 14 feet the clearance of 2 feet necessary for safety can be maintained with a loss in speed and an increase in power. Reference to the river heights given in paragraph 12 will show that on the average the river surface falls below the plane of 1 foot above the plane of lowest low water 16 times in a year. Consequently, if a 14-foot project were adopted, a clearance of 2 feet could probably be maintained at all times, and during high tides every day and at low tides during three-fourths of the navigation year a depth of 16 feet would prevail. With the present project depth of 12 feet at lowest low water navigation is unhampered by the influence of too small a clearance only for a brief period during each day, and for more than half the navigation year safe clearance can be obtained only at the expense of reduction of speed and increase of power; during low-water tidal stages the clearance is unavoidably reduced below the safety point. As an incidental advantage it should be noted that if the discharge capacity of the river is increased freshet heights will be reduced to some extent.

95. *Cost.*—The additional cost of modifying the present project to provide a depth of 14 feet at lowest low water is estimated to be about $3,000,000. This estimate is made without a full knowledge of the exact areas of the underlying reefs, but it is believed to be fairly accurate. It is believed that the considerations advanced above show that the benefits to be derived from the expenditure of this sum are great and undoubted. Further than this, and in anticipation of the possible future necessity and present strong demands for a channel for seagoing vessels, it might be wise to furnish the most thoroughly adequate facilities for present commerce in order that every opportunity may be had for obtaining positive indications of the necessity for further deepening. It may

be argued that if a much deeper channel is to become a necessity in the future it would be economical to construct it at once rather than by successive steps. This is undoubtedly true if the cost of construction alone is considered. However, it is the ultimate net expenditure which should be considered, and if the return on the investment is not to be realized immediately the interest which must be paid without a compensating return may be greater ultimately than the increased cost involved in doing the work in successive installments. It is believed that the cost involved in an increase in depth of 2 feet beyond that of the present project would bring an immediate return on the investment and will be a step in the direction of greater improvements likely to be needed later. Nevertheless I am unable to satisfy myself that the annual saving to the people of the United States which would result from the increase of the projected channel depth to 14 feet at the lowest stages would reach for some years the sum of $90,000 (the interest at 3 per cent on the money which would have to be spent to gain this increase). Therefore I am unable to recommend it at the present time.

96. *Public opinions.*—The opinions of the various commercial bodies, of merchants and manufacturers, and of the navigation interests can be found in inclosures A to D,[1] inclusive. Though there is an influential element which deems necessary the improvement of the upper Hudson to permit of its navigation by seagoing vessels and advance arguments of weight in support of this view, opinions on this point are divided. All, however, are united in a belief of the great utility of the river as a commercial highway of national importance.

XIV. CONCLUSIONS.

97. As a result of the investigation which has been made, the chief points of which are embodied in the above discussion, the conclusions have been reached: (1) That the immediate benefits to be derived do not justify the cost of constructing at this time a channel of sufficient depth to accommodate seagoing vessels; (2) that such a channel may become an economical necessity in the future; (3) that the river forms an integral part of a great waterway system of such importance that any improvement at reasonable cost necessary to facilitate the handling of its commerce is worthy of careful consideration; (4) that the needs of this commerce are not fully met by the channel depth of the approved project, viz, 12 feet at the lowest stages; (5) that an increase of the proposed channel depth to 14 feet at the lowest stages would be very advantageous, but that the saving which would result from such an increase at the present time would not justify the expense.

In my opinion, therefore, a further improvement of the Hudson River with a view to obtaining increased depth over that called for under the approved project should be postponed until the effects of the opening of the New York State barge canals on the character and volume of the commerce of the Hudson and on the types of vessels used in the trade shall have become manifest and the economic necessity for an increased depth shall have been proved.

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[1] Inclosures C and D not printed.

XV. CORRELATED IMPROVEMENTS.

98. In the reach of the river between Hudson and Troy there are no possibilities for the development and utilization of water power for industrial and commercial purposes. The question of terminal and dock facilities is being handled by the State of New York as described in paragraph 40. The pollution of the river by sewage is important and has reached a stage at which the interests of navigation are affected, and it is, therefore, thought that this question might well be taken under consideration by the Federal Government.

Very respectfully,

W. M. Black,
Colonel, Corps of Engineers.

The Chief of Engineers, United States Army.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

[Inclosure A.]

IN THE MATTER OF THE PROPOSED INCREASED DEPTH OF THE HUDSON RIVER.

Minutes of public hearing, held at the common council chamber in the city of Albany, N. Y., on Monday, December 18, 1911, at 10 a. m.

Present: W. M. Black, Colonel, Corps of Engineers, United States Army; R. D. Black, Lieutenant, Corps of Engineers; R. H. Talcott, assistant engineer.

Appearances: William B. Jones, 95 State Street, Albany, N. Y., secretary chamber of commerce, representing Albany Chamber of Commerce; Mortimer G. Barnes, State Hall, Albany, consulting engineer, representing City Planning Association; Edward N. McKinney, representing Albany Chamber of Commerce; Joseph Ripley, State Hall, Albany, N. Y., consulting engineer, representing State engineer; M. D. Hanson, mayor, Cohoes, N. Y., representing city and chamber of commerce; Peter D. Kiernan, 244 Clinton Avenue, Albany, representing Rose & Kiernan; J. H. Perkins, 60 State Street, Albany, banker; R. S. Greenman, 40 Manning Block, Albany, civil engineer; E. N. Huyck, 319 State Street, Albany, N. Y., manufacturer; Earle Furman, Schenectady, N. Y., representing Schenectady Board of Trade; Edward F. Murray, vice president Hudson Navigation Co., Troy, N. Y.; Geo. L. French, Troy, N. Y., representing Tim & Co.; Daniel E. Hutton, Troy, N. Y., secretary chamber of commerce, representing chamber of commerce; Geo. E. Post, 27 Riverside avenue, Rensselaer, representing Hudson River Day Line; A. H. Burder, Schodack Landing, representing Hudson Navigation Co.; Lawrence Murray, Albany, N. Y., representing Albany Sand & Supply Co.; W. O. Parkinson, Castleton, N. Y., wholesale ice dealer; James C. Sheahan, 24 Delaware Avenue, mason; Capt. John D. Silliman, 8 Riverside Avenue, Rensselaer, representing Cornell Steamboat Co.; Capt. Geo. H. Keller, 1 Broadway, Rensselaer, representing Hudson Navigation Co.; James M. Ropes, 467 Broadway, Albany, representing Albany & North River Mold Sand Co.; Walter Melius, city engineer, City Hall, Albany, N. Y.; Wm. L. Visscher, lawyer, Tweddle Building, Albany; Henry Streibert, 50 State Street, representing Civic League; H. S. Ludlow, Troy, N. Y., president Troy Record Co., representing Troy Chamber of Commerce; Meluis F. Burns, mayor-elect Troy, N. Y.; James H. Spotten, 499 First Avenue, Upper Troy, representing Troy River Co.; John A. Cipperly, 18–20 State Street, Troy, N. Y., representing Troy Chamber of Commerce; G. P. K. Pomeroy, physician, representing town of Stuyvesant; Robert H. Rogers, Schenectady, N. Y., electrical engineer, representing General Electric Co.; Walter H. Reed, Schenectady, N. Y., secretary board of trade; Jas. A. Walker, 31 Erie Street, Albany, N. Y., representing Cornell Steamboat Co.; W. B. Elmendorf, general agent Day Line, 325 Broadway, Albany, N. Y., representing Hudson River Day Line; John W. Huff, Waterford, N. Y., representing Waterford Chamber of Commerce; Charles W. Heald, Buffalo, N. Y., Lake Transportation, representing chamber of commerce; H. D. Kaufman, 518 Robinson Building, Elmira, N. Y., representing Law and Order Union; Henry W. Hill, 511 Mutual Life Building, Buffalo, N. Y., representing Chamber of

Commerce and Manufacturers' Club of Buffalo; Albert I. Marx, 515 Broadway, Albany, N. Y., representing Albany South End and Taxpayers' Association; Geo. D. Babbett, 451–453 Broadway, Albany, representing Babbett & Co.; W. B. Wackerhagen, 39–43 State Street, representing Albany Hardware & Iron Co.; John D. Blackburn, Albany, N. Y.; Gardner C. Leonard, 472–478 Broadway, Albany, N. Y., representing Cotrell Leonard; John N. Briggs, Coeymans, N. Y., ice and excursions, for himself; W. B. Hall, Troy, N. Y., representing Troy Chamber of Commerce; Wm. S. O'Brien, 405 River Street, Troy, N. Y., representing Troy Chamber of Commerce; J. Y. Read, 191 Hamilton Street, Albany, N. Y., representing City Planning Association; Geo. D. Cooley, 79 President Street, Troy, N. Y., representing Troy Harbor; C. E. Keith, 23 South Pearl Street, Albany, N. Y., representing Standard Oil Co. of New York; L. A. Rose, Rensselaer, representing Rensselaer Chamber of Commerce; Dr. M. Spiegel, Delaware Avenue and Catherine Street, Albany, N. Y., proprietary medicine; H. H. G. Ingalls, Castleton, N. Y., representing Ingalls & Co., paper manufacturers; Ulster Davis, 2 Second Avenue, Rensselaer, N. Y., representing the Albany Towing Co.

Col. BLACK. The meeting will please come to order. Gentlemen, this hearing is had in response to requests from certain bodies of the city of Albany asking for a public hearing prior to the submission of the report on the preliminary examination of the Hudson River with a view to securing increased depth, a letter from the Albany Chamber of Commerce, dated November 20, 1911, requesting a public hearing, a letter from the South End Business Men's and Taxpayers' Association, dated November 25, 1911, and a letter from the City Planning Association dated November 25, 1911.

In accordance with that a letter was sent out by my direction by my assistant in Albany, Lieut. Black, making a call for a hearing, as follows:

NOTICE OF PUBLIC HEARING.

IMPROVEMENT OF HUDSON RIVER, N. Y.,
UNITED STATES ENGINEER OFFICE, 25 NORTH PEARL STREET, ROOM 38,
Albany, N. Y., December 11, 1911.

The district engineer office, New York district No. 1, having under consideration the question of securing increased depth in the Hudson River in connection with the preliminary examination and survey of "Hudson River, with a view to securing increased depth," ordered by the river and harbor act approved June 25, 1910, will give a public hearing at the common council chamber, city hall, Albany, N. Y., on Monday, December 18, 1911, at 10 o'clock, a. m.

The district engineer officer, Col. William M. Black, desires that parties interested in the navigation and commercial uses of the Hudson River appear in order that full advantage may be taken of the opportunity to present all statements and arguments in connection with the proposition of securing increased depth.

While oral statements will be heard and given due consideration, important facts and arguments, which it may be desirable to forward for the consideration of higher authority, should be submitted in writing.

Attention is invited to the fact that the Hudson River is now being improved under a project which calls for a depth of 12 feet at all times of the year and a channel width of generally 400 feet. The question to come before the hearing relates solely to the advisability of securing a depth greater than that to be provided by this project.

You are invited to be present and be heard.

R. D. BLACK,
First Lieutenant, Corps of Engineers.

A copy of this notice was sent to quite a number of people in this vicinity, all who were known to be interested people, associations, and officials, and the list of persons to whom this notice was sent is here and can be examined at any time you may so desire.

In addition to that, publicity as to the hearing was given in the daily papers in Albany and Troy.

We have received in response several letters from people stating their inability to be present to-day, one from ex-Gov. Fiske, of Vermont, who, I believe, will be represented through one of the members of the Albany Chamber of Commerce. Then we have one here from Witherby-Sherman & Co., iron ore, pig iron, phosphates, United States Press Building, New York, in which he regrets that he can not be present and states that he is quite in favor of deepening the river up to Albany.

I have also here a letter that was received just one year ago from Mr. Edward P. North, of New York, a very prominent civil engineer, who has long been interested in the improvement of the Hudson, in which he very strongly advocates the deepening of the river.

The project for increasing the depth of the Hudson River has been under consideration for many years, as you know. The project adopted by Congress is to give a depth of 12 feet at all stages as far north as Waterford; and for many years, since about 1890, the State and United States have been working to secure navigation for light-draft vessels through the Hudson up to the same point; that is, as far north as Waterford, the United States never having attempted to do any work above Waterford.

In 1890 and 1891 Congress ordered a preliminary examination of the Hudson River with a view of securing a depth of 20 feet to Albany. That was very carefully considered and reported on by a board of engineering officers under date of November 20, 1891. After giving public hearings and investigating the subject the board wrote an exhaustive report in which the conclusions were that unless there were a deep-water canal carried across connecting the Hudson River with the Great Lakes it would be inexpedient for the United States to attempt to secure this greatly increased depth as far as Albany, but the board then recommended a depth of 12 feet as far as the State dam.

This subject has been reopened by congressional action in the river and harbor bill approved June 25, 1910, in which the Secretary of War is directed to have a preliminary examination of the Hudson River, with a view to securing an increased depth, that depth being greater than the depth of 12½ feet now secured by the action of Congress.

I presume you are all familiar with the method followed by Congress for the adoption of projects for river and harbor improvements, the first step being the order for a preliminary examination and survey if required. The Chief of Engineers has this preliminary examination and survey made by the officer in charge of the district in which the improvement is desired. This officer submits his report with recommendations favorable or unfavorable. When the report is submitted it is sent to a board of review called the river and harbor board, in Washington, and if the district engineer officer recommends against the improvement for any reason he is called upon to notify the Members of Congress and Senators interested and also the prominent citizens interested in order that they may have an opportunity to submit their views before this board of review before action is taken by the board of review. Now, that is still to come. This hearing to-day is before me in order that I may hear your arguments and to present such of them as are given orally in the report of the proceedings and such as are given in writing along with my report, whatever it may be, favorable or unfavorable, to the board of review. After this has been received by the board of review should my report be unfavorable you will be notified again, and have another opportunity for a hearing before the board of review. It then passes on the project and submits through the Secretary of War the recommendation to Congress, and again an opportunity is given for hearings before the committees of Congress, because Congress is perfectly independent and acts in accordance with or contrary to the views of the officers who have recommended matters accordingly as they may deem best, so that this is only the first step in this matter.

In having this hearing to-day I would request that you confine yourselves closely to the remarks for the necessity for an improvement beyond the depth of 12 feet at the lowest water, and particularly also bear in mind, if you please, that under the action of Congress I am only called upon and permitted to make recommendations for increased depth as far as Albany, no farther. My assistant tells me that I am mistaken. Yes, it is the Hudson River, the whole way, but it must be over 12½ feet.

I would ask those of you who speak to first give your name and whatever body or association you represent, or, if you represent no association, your business address and the state of your business, so that the stenographer may put it down and this may appear in the report of the proceedings, which will be gone over carefully without doubt by the board of review. I would also ask you to speak rather slowly in order that the stenographer may be able to take down what is said, and, of course, only one person should speak at one time, otherwise the minutes get very confused indeed.

I think you are all sufficiently familiar with the river to know that there is practically 20 feet of water as far north as Hudson, so that it becomes a question then of the improvement of the river to the north of Hudson. I would be glad to hear from any of the gentlemen who wish to be heard; perhaps Mr. Jones will be able to call them in order. Let us have first the statements in favor of getting a depth of water beyond the depth called for on the existing project of 12 feet at the lowest water.

Mr. JONES. Mr. Chairman, in order to present the matter and start the meeting, I would like to make a statement, that the Albany Chamber of Commerce ever since its organization has felt that the commercial prosperity of this section of the State could only be best conserved by securing in the channel of the upper Hudson a depth of water sufficient to operate with safety larger vessels and more vessels than are being operated at the present time. The channel as it exists at the present time is not sufficient to properly accommodate the existing traffic, and very often the boats are grounded even in the center of the channel itself. The present improvement which is now under way for the securing of a depth of 12 feet at extreme low water or at all stages will practically give us at mean low water in front of the city of Albany a depth of about 14½ feet. This depth is not sufficient, as has been shown to your honorable body by letters and other matter from the steamboat men operating boats on the river, to properly care for and to allow safe navigation of the commerce already existing on the upper Hudson River; and that if we are to take care of this commerce properly and if we are to care for the increased commerce which will come to the river upon the completion of certain improvements, then it is necessary for us to secure a still greater depth than the depth now under consideration, 12 feet at extreme low water. I am not going into the arguments which we have already presented. We have submitted to you from time to time letters and briefs and other things in connection with the supporting of our argument.

However, I do want to take this opportunity of submitting to you a memorandum calling attention to certain features of our former briefs and letters, and with it I also want to present a resolution which was unanimously adopted by the Senate and Assembly of the State of New York in 1909, placing the Legislature of the State of New York on record as favoring this improvement; also two resolutions which have been adopted at two of the annual meetings of the Atlantic Deeper Waterways Association, favoring an increased depth in the upper Hudson, and also a resolution which was unanimously adopted in Buffalo by the New York State Waterways Association, advocating a still further improvement, and together with that some communications which I have received from different organizations and individuals further commenting upon and asking for this improvement.

As secretary of the chamber of commerce, an organization which is endeavoring to bring manufacturing industries into this locality, we are constantly met with the question regarding the shipping facilities, and we have come to believe and we honestly believe that we are never going to be able to locate in the vicinity of the Hudson River or the Erie Canal other than at the mouth of the river and at the mouths of the canal large manufacturing industries until we have an adequate depth of water that will allow water transportation for the bringing in of unfinished product and the taking out of finished product, and we believe that the commercial supremacy of this part of the State and also of the entire State itself depends largely upon a greatly improved channel in the Hudson River where business can be carried on to a larger extent and where business can be carried on with more safety and with possibly a deeper draft of vessels.

It is hardly necessary for me to say here before the engineers who themselves made the tests that it would be absolutely impossible to run the steamers of the Hudson River day line in the upper Hudson under full speed, even if there would be no slowdowns, for the squat of the boat would put the boat right on the bottom, the boat, as I remember the figures that were presented, having a drop under half speed of 3 feet and under full speed of practically 4 feet.

I would also like to state, Mr. Chairman, this morning there are a large number of men here representing different interests along the Hudson River from Hudson, North Hudson, New Baltimore, Coxsackie, Coeymans, Rensselaer, Albany, Troy, Cohoes, and also representatives from Buffalo and other points, the majority of whom have not come here to present argument but to rather place themselves on record as being in favor of this improvement, believing, as we believe, that it is going to bring increased commercial prosperity to the sections of the State which they represent. Some of these gentlemen, however, I believe are ready to present arguments to you this morning. I think that Mr. Barnes will speak.

Col. Black. One moment, please. You speak very indefinitely, Mr. Jones. Congress is called upon from all parts of the country to invest the people's money in improvements, all of which have merit. It is necessary for Congress and for those who are the advisers to Congress to differentiate between these improvements so as to show those which are the most necessary for the people; and the only means that I can tell of getting at it is to weigh the cost of the improvement, the interest of the people's money as invested in that cost against the saving to the people that will result from the improvement. You have spoken several times of increased depth and of adequate depth. That gives us no idea at all. The cost of improvement of increased depth will vary with each foot of depth attained or to be attained, and in 1891 to get a depth of 20 feet to Albany alone the estimated cost was $19,000,000 and over. So that I would be very glad indeed to know just what depth you have in mind and how you think the cost of it would be compensated for to the people.

Mr. Jones. I have taken it for granted, Col. Black, that you understand the proposition that we ask for an increase of depth to 20 feet.

Col. Black. No, sir; there is no depth mentioned.

Mr. **Jones**. It has been in our former arguments.

Col. **Black**. Yes; but not at present.

Mr. **Jones**. Not at present.

Col. **Black**. No.

Mr. **Jones**. We ask for that depth.

Col. **Black**. A depth of 20 feet?

Mr. **Jones**. We ask for a depth of 20 feet. We ask for it and we would like in connection with that in speaking of the work of the improvement, the matter of getting back at least interest on the money invested, we would like to call attention, as I have suggested before, to the difficulties in the first place of navigating on the river at the present time and the increased cost of navigating a boat with a small amount of water under her bottom. We have submitted with our evidence in one of the former hearings and at a former request an article showing the cost of operating a steamboat with 12 inches of water under her bottom and the cost of operating the same boat with 3 feet, practically, of water under her bottom. We have tried to show you that the increased depth would make it possible for a less cost in operating to steamers, would also make it possible to make an increased time, would make it possible for the business on the river at the present time to increase and the cost to decrease, and, consequently, be an improvement or a great help to the traveling and to the shipping public.

We understand that plans are to be ready just after the 1st of January for the construction in the cities of Albany and Troy of terminals for the barge canal. We believe that the congestion of New York City at the present time is so great that if it were possible for a certain class of steamers with westbound freight to come to Albany and Troy and at the modern terminals here tranship that freight, that they would come here, and it would be less expensive to them in every sense of the word.

Col. **Black**. What class of steamers would you mean; you mean coastwise?

Mr. **Jones**. Possibly coastwise steamers; yes, sir.

Col. **Black**. Yes; because the ocean steamers all have draft over 20 feet.

Mr. **Jones**. We have no idea of that at the present time at least, and we haven't the heart to ask for it, and we haven't the faith that we would get it if we did ask for it—to attempt to make Albany a seaport town in which ocean-going vessels might come. We have had advice from the city of Buffalo and from Tonawanda that the lumber merchants there are considering the advisability now of shipping their Pacific coast lumber in bottoms down the Pacific coast and through the Panama Canal and up the Atlantic chain of waterways and the proposed intercoastal canal and up the Hudson River as far as they can get these vessels, preferably Albany or Troy, and tranship that freight in the canal bottoms through the canal to Buffalo rather than across country.

Col. **Black**. That would then limit, of course, the bottoms to the depth in the canal?

Mr. **Jones**. To the depth in the canal.

Mr. **Black**. That is 12 feet.

Mr. **Jones**. We understand that those boats that are coming, the lumber boats that they are talking about operating on the Pacific coast and the Intercoastal Canal and the Panama Canal, would have a depth of from 14 to 16 feet only, and that they could come here to Albany with sufficient width and depth in the river and probably unload at these terminals.

Another question which we believe would enter into it very largely is the question of a new freight route from New York to Chicago and points west. There already exists a route and a rate water-rail to Chicago and points west from New York via Boston, Providence, Richmond, Norfolk, Philadelphia, and one or two other points, water to those points and rail west. Last year an application was made to the Interstate Commerce Commission establishing such a route via Albany, via water to Albany and rail west—Albany and Troy, I believe both cities were mentioned. The mistake that was made in connection with that by the railroad companies was the fact that they combined that with another route, making a water-rail-water route—in other words, water to Albany or Troy, rail to Buffalo, and water to points west; and the Interstate Commerce Commission decided against it, because they said it would bring on what they considered a rate war. Now the railroad companies, as we understand it, are prepared to make another application, and we have it on pretty good authority that the Interstate Commerce Commission will grant that application in making a water-rail route via Albany and Troy and rail to Chicago and points west, which will be a little bit less owing to shorter distance than the same rate via these other points and will be about 12 hours shorter than in any other way, and we believe, sir, if this new channel is established that this new rate will come into existence.

And we believe that all of these things, together with the commercial prosperity of this city and of Troy and of the neighboring parts of the State, depend not upon a prospect in the far distance of securing a 20-foot channel in the Hudson River, but a placing on record now of the fact that the Government is in favor of spending that money and establishing such a channel, the working out of which will take, to say the least, several years, and enable us to go out after these additional freight lines, after this additional freight to be transhipped at this point, and after these new and larger manufacturing industries, which on account of certain failures in being able to handle them properly in shipping facilities, are seeking other places in the Western States. If New York State is to stand as the Empire State, if New York is to hold her present commerce and add to it, her shipping facilities by both rail and water must be increased at the earliest possible moment, or the things that we are reaching for will go beyond our reach, and the things that we have will be taken away from us by those who are more aggressive and by those who are more progressive than we are in this Empire State.

Mr. BARNES.

Col. BLACK. Are you representing any bodies at all, Mr. Barnes?

Mr. MORTIMER G. BARNES. Yes, sir, I am consulting engineer and represent the Albany City Planning Association. This association, the Albany City Planning Association, asked me only a few days ago to present this matter to you from an engineer's standpoint. You undoubtedly know that it takes some time to prepare an argument for a project of so great importance as this one is, and I feel that all I have to say this morning is simply an outline to what I would like to take up if I had had greater opportunities. And I also feel that we have some opposition to overcome in the reports that have been made before that are more or less unfavorable, especially the one that you have just referred to made in 1891, as I recall, which favored a 12-foot draft. I do not know what representations were made to the officer at the time from which he made his decision, but I apprehend possibly that sufficient showing was not made at that time to justify him in asking for the expenditures, which, as I understand, you said is something like $19,000,000.

Lieut. BLACK. $19,000,000 to the State dam and $5,900,000 from New York to Albany.

Mr. BARNES. I was afraid that there was a mistake in the $19,000,000. To the State dam?

Col. BLACK. Yes; $6,000,000 from New York to Albany.

Mr. BARNES. That is for 20 feet draft?

Col. BLACK. That is 20 feet draft; yes. That is a channel 20 feet deep and 400 feet wide, New York City to Albany.

Mr. BARNES. Well, that is more nearly my idea, although I have not been through that yet. I do not quite consider that that is a precedent that should be followed now. There may not have been the necessity for that expenditure at that time, but our commerce has grown enormously in the last 20 years and what may not have been needed then may be necessity now. You will recall that the registered tonnage entering New York port has increased 50 per cent in the last 10 years, so that in the last 20 years probably 100 per cent over what it was at that time, and the congestion in New York I need not take your time with now.

Since the early settlement of the United States the Hudson River has been one of the most important commercial rivers in the country. Troy and Albany, located in close proximity to cheap water power and at the confluence of the Hudson and Mohawk Rivers and the Erie and Champlain Canals, early became important manufacturing towns and distributing centers for the rich hinterland to the north and west. Before the perfection of railroads and steamship transportation the canals of the State did a flourishing business and Albany was a seaport town of no mean importance for that time.

Later deep-draft steamships came upon the scene and railroad transportation became so perfected as to challenge the supremacy of the State canals now in operation.

The wise business men of the State, realizing that the State canal system had made this Commonwealth the "Empire State," saw that something must be done to retain that position. As a consequence after much study the barge canal project was successfully launched, which project when completed will give the State a canal system of much greater dimensions than it now enjoys, and it is hoped that a further reduction of freight rates and an increased amount of freight handled will result. It is believed that the building of this canal system will be of incalculable benefit to the State of New York and to the United States and Canada.

In the past the idea in canal building has been simply to make them carriers of freight with no thought of handling and delivering freight at terminals. Shippers are now beginning to see the need of terminal and warehouse facilities in connection with canals, and New York, proposing to be a pioneer in this movement, has just voted to expend $19,800,000 to establish port and terminal facilities.

As a complement and further aid to economical handling of its products, the State is expending over $50,000,000 in building a system of macadamized highways. To still further develop its natural resources, the State has organized to expend many millions of dollars in developing its water powers and forest preserves. All these, it is reasonably believed, will greatly increase the commerce and importance of this part of the State.

The State has assumed control of its river system down to the tidal Hudson, and when the present and proposed projects of improved canals and powers are completed, the State will have expended over $200,000,000. As suggested above, the expenditure is of more than local importance. Its influence will be far reaching. Freight rates to all parts of the country will be reduced. With the completion of the canal system, the State will have over 800 miles of waterways with a depth of 12 feet or greater. The commerce of the upper Mississippi and Great Lakes will be brought to and returned from tidal waters now under the control of the Federal Government.

What now shall be the action of the Federal Government in assisting in the distribution and carrying on of this immense commerce with the Atlantic coast cities and foreign lands? That is the question Congress has asked you to solve and to that end the citizens have asked for this hearing to aid you in the matter.

The commercial importance of this district is well known and I need not take your time with its recital. The evidence already in your hands is unanimous in stating that even the present commerce is not adequately cared for by past projects for improving the tidal Hudson.

PROBABLE INCREASE OF COMMERCE.

A very material increase in commerce may be expected upon the completion of the State's works above mentioned. The natural growth and development of the country at large is increasing its commerce faster than common carriers can handle it. The Pere Marquette Magazine, published under the auspices of the Pere Marquette Railway, in the issue of July, 1911, in giving reasons why freight rates will not be further reduced, says:

"That there will be a shortage of railway accommodations is as fixed a fact as the stopping of the reduction of railway rates."

Mr. James J. Hill, the railroad man, makes another statement even stronger than that. I am reading now from House Document No. 492, quoting from Mr. Hill's speech in Chicago:

"In the past 10 years the growth in ton mileage was 110 per cent and the growth in the mileage of railroads to handle the traffic was only 20 per cent. The traffic of the country is congested beyond imagination; the commerce of the country is paralyzed; and to continue it means slow death. It is estimated that from 115,000 to 120,000 miles of track must be built at once to take care of this business. It will cost from four billion to five billion to complete this work. Why, there is not enough rails or money in the world to do this thing, and if the rails were piled up ready for the undertaking and if the money were in the bank to-day it would be impossible to get sufficient labor with which to complete it."

And then comment by Mr. J. Frank Tilly, of Pittsburgh: "And when we consider the commerce of the country is increasing by great leaps and bounds we find commerce has already far overlapped the facilities to handle it. Where freight is proffered instead of being sought the carrier will not be considerate in fixing the rates."

That is the condition that is fronting us now. The commerce has already grown to such an extent that it is well-nigh impossible to handle it in New York City. New York City, as you well know, is so situated as to make it impossible for railroads generally to do business on Manhattan Island from a direct connection with the continent. Hence nearly all of the commerce of New York City must be handled on car floats. The only railroad that enters New York City now, the New York Central, I am informed, carries about three-fourths of its commerce by car floats. All this means a great congestion of the harbor for car traffic that might otherwise be used for the natural and legitimate water-going traffic coming into the harbor. If New York City is to maintain its supremacy some overflow point must be provided that will take care of the commerce that is naturally coming this way, the natural growth of the country.

The experience of merchants of this district now in trying to secure a bill of goods from points as near as Utica or New York is that it takes from four to five days to secure these shipments by rail. The New York Central Railroad is now entering upon a project of six-tracking its Mohawk division and four-tracking the Hudson River division. This railroad realizes that it can not now adequately handle the freight offered. It is the belief of the writer, and quite generally shared by others who have made a study of the situation, that the present project, namely, 12 feet at lowest low water, will not adequately and safely care for the needs of commerce when completed.

Assuming this to be a fact, the question arises, What depth and width will be adequate? This question naturally suggests another one, namely, Shall the river be made to accommodate barge-canal traffic, or shall it be made sufficient to make this district a seaport? No one will question the necessity of improvement necessary to take care of the barge-canal traffic. Hence it remains for us to address ourselves to the latter question. Those who argue against the idea of making this a seaport point to the fact that other points along the Hudson that now have ample depth of water have not developed into seaports. To the writer it would seem a most remarkable occurrence if the towns between Albany and New York had developed into important seaports. The first requisites of a seaport are that it shall have good harbor facilities and shall be so situated as to become the natural distributing point for the large and rich hinterland. None of the towns between Albany and New York possesses these advantages. They are not so located as ever to become distributing points, and so long as the trade is confined to the towns along the river the commerce will continue to be desultory, but let some port become the natural distributing point for the large hinterland and its commerce will become incalculable. The capital district has the natural advantages and situation for such a port. It is at the focal point of several systems of railways which reach to the New England States on the east, Canada on the north, and the northern Mississippi and Great Lakes system on the west. It is situated at the junction of the Erie and Champlain Canals, which also reach the above territory except the New England States. This district has all the requisites of a seaport except an adequate channel in the river. In spite of this handicap it has grown to be a district of great commercial importance. The water-borne commerce of the tidal Hudson last year exceeded 5,000,000 tons, valued at $110,000,000, more than Pittsburgh and Cincinnati, about 70 per cent of this being local commerce.

As a matter of comparison, commerce in this locality, or the commerce of the tidal Hudson, is greater than the commerce of the largest cities on the Ohio River. The commerce, as given in this House Document No. 492 I have just read from, gives the water-borne commerce of Pittsburgh as between 4,000,000 and 5,000,000 tons, the water-borne commerce of Cincinnati at 4,000,000 tons, the water-borne commerce of Louisville at something greater than 1,000,000 tons; and the commerce of the lower ports is in part counted in the commerce of the upper ports—that is, some commerce that leaves from the upper ports is received in part at the lower ports, so that it is in a measure duplicated. Moreover, the commerce of the Ohio River is of extremely low value. It is said 91 to 92 per cent of the commerce passing Davis Island Dam is coal, which is shipped down the river, being a very low-price commodity; while, on the other hand, Albany's commerce is largely of a manufactured nature and high priced. As stated above, the value of the commerce is estimated at $110,000,000. The commerce by rail is many times this amount. The completion of the barge canal will add at least 20,000 horsepower of water power to this locality. The completion of only one storage reservoir on the upper Hudson will increase the power of the Hudson 33⅓ per cent. This increased power means new industries and greater commerce.

In this connection it is interesting to refer to some industries that might want to locate in this locality. I have recently been informed by very good authority that a steel-manufacturing concern is now looking for a location where it can have direct communication with the barge canal, the various railroads, and with seaport towns. Naturally Albany is that location. As previously stated, we have a large amount of cheap power here and know that our power will be greatly increased at the completion of the barge canal. We must look somewhere for industries to use that power. Just last night——

Col. BLACK. Mr. Barnes, you say you have a largely increased amount of power; what do you mean—in Albany?

Mr. BARNES. The capital district within a radius of 25 miles from Albany, within reach of the tidal Hudson by trucking. Even if the power is generated at the site of the dam the distance of transmission is so short that it can be transmitted and used along the tidal Hudson. Here is a new industry that is proposing to or is in the process of experimental stage that may be of great importance in this locality. I speak of the grinding and reducing the Cuban cane. This is a clipping from Habana:

"Great interest is being taken among sugar planters in the experiment of shipping large quantities of desiccated sugar cane to the United States. This is to be carried out during the sugar-grinding season beginning next week. Small trial shipments were made last year with success.

"Some authorities on sugar manufacture predict, as a result, the ruin of the sugar-mill industry in Cuba and the deterioration of millions of dollars' worth of property in the shape of mills, with a great increase of unemployment. In some quarters there is an agitation for an export duty on desiccated cane, but other authorities say that as the new process will probably decrease the cost of sugar, more will have to be planted, and therefore the displaced labor will find employment in that direction."

That interests Albany in that if it is a success Albany can not compete for those mills without it is made a seaport town. When I speak of Albany I mean the capital district, not necessarily Albany alone, but anywhere from Hudson to Troy.

Another argument presented by some is that the present project is sufficient for present river craft, hence what is the use of a greater depth? In the first place, the writer does not concede that the present project is adequate. In the second place, that is an argument that is always presented by those who have built for the channels available and wish to avoid the competition of larger boats. The same argument was presented strongly at the time the Weitzel Lock was proposed at Sault Ste. Marie and again when the Poe Lock was proposed; the former increasing the depth between Lake Superior and Lake Huron to 16 feet, the latter to about 19 feet. In 1880, before the Weitzel Lock was completed, the commerce at that point was 1,322,000 tons; in 1890, 9,000,000—an increase of 700 per cent. While in the decade 1870 to 1880 the increase was 100 per cent, or, in other words, the increase in the 10 years previous to the completion of the Weitzel Lock was only 500,000 tons, or 50,000 tons per year, while in the decade next after the completion of the lock the increase was approximately 8,000,000 tons, or 800,000 tons per year.

In 1897, the year after the completion of the Poe Lock, the commerce was 19,000,000; in 1907, 58,000,000 tons; last year, 62,362,218 tons. The freight rate on general merchandise to and from Lake Superior points in 1887 was $4 per ton; in 1897, $2.30 per ton; in 1907, $2 per ton. While these projects have increased enormously the traffic on the Great Lakes and reduced the cost of transportation, the owners of small boats have continued to do business as before.

The conclusions reached, therefore, are:

1. The capital district is one of great commercial importance now.
2. The completion of the projects now under way by the State will greatly increase its commerce.
3. The capital district is the natural distributing point for a very rich and rapidly growing territory.
4. The improvement of the Hudson River is not a local question, but is of State and national importance. Hence, something more than the commerce of this district should be considered.
5. The present project, when completed, will not be adequate for the commerce at that time.
6. Completion of ship channel.

FURTHER IMPROVEMENT OF THE RIVER.

Dismissing for the time the question of further improvement to accommodate the present craft, we now come to another phase of this discussion, namely, (1) what will be the result if the capital district is made a seaport, and (2) will over-sea vessels use the river, and can they transport freight as cheaply as can be done by barges?

Answering the last question first, the following table shows the cost of haul by various craft.

This table has not yet been compiled completely, and I am going to ask your indulgence for a few days until I can get it compiled, and transmit with a letter, but the general results show that the commerce can be carried on more cheaply in ocean-going vessels than in our thousand-ton barges. The table that I have prepared is theoretical, of course, but it is thought to be comparative; if not showing the actual cost, it is comparative. So when you have gotten this data you can study it out at your leisure to show the point I am trying to make

The table referred to is as follows:

Cost of water transportation.

	(F) Ocean vessels.	(A) 1,000-ton barges.	(C) Car ships.	(D) Car floats.
Length over all....feet..	480	150	268	
Breadth....do....	52	25	75	
Draft....do....	19	10-7½	10	
Speed, statute miles per hour....	12½	6	8	8
Indicated horsepower....	2,200		2,500	
Carrying capacity....net tons..	8,600	3,900	375	800
Cost of ship....	$387,000	$115,000	$200,000	$160,000
Pay roll per day, including subsistence....	$60	$40	$40	$40
Percentage cost for repairs and depreciation....	5	5	5	5
Percentage cost for insurance....	4½	3	3	4½
Interest....per cent..	5	5	5	5
Incidental expenses per day (coal, waste, etc.)....	$117	$50	$50	$50
Total cost per day (above items)....	$330.75	$131	$161.23	$153.56
Total cost per mile....	$1.1025	$0.909	$0.84	$0.80
Total cost per ton-mile....mills..	0.128	0.233	2.24	1.00
(E) Approximate charge per ton-mile....do....	0.74			
(B) Approximate charge per ton-mile (Albany-New York)....mills..	1.272	1.3		
Canal boats charge per ton-mile....do....		2		

Col. Black. In your table do you take into consideration the insurance interest rates?

Mr. Barnes. Yes, sir; by the way, the increase of the insurance rates and the cost of maintenance and operation combined are but a small percentage of the general charge of handling freight. The largest charge is, as you know, the pay of the crew, the maintenance of the crew, and cost of coal and water and fuel and so forth.

Of course, the foregoing table is purely theoretical, but it shows the comparative cost if not the actual. From this it appears that transportation by over-sea vessels is the cheapest method. It also shows that the charge for hauling is less by over-sea vessels. If the rate is less, undoubtedly over-sea vessels will use the river provided it is made safe for navigation.

The answer to the first question involves a discussion of freight rates both by rail and water.

The following is the tariff from the capital district to New York:

[Rates in cents per hundredweight.]

	Class.					
	1	2	3	4	5	6
Water	23	19	15	12	10	9
Rail	26	21	17	13	11	9
Rail and literage	27	22	18	14	12	10
Terminal charge	3	3	3	3	3	3

If breaking bulk at New York can be eliminated, there is saved at once the terminal and lighterage charge, amounting to 80 cents per ton. The second item of saving is the difference in hauling charge between New York and Albany. If the charge in over-sea vessels is the same as the charge in packet boats plying between Albany and New York, the saving over rail rates would be 40 cents per ton for third-class freight. If vessels are plying between this port and European and Pacific coast points, the rate to Albany would be little, if any greater than to New York, and the saving on third-class freight to the capital district would be approximately $3 per ton.

Let us consider a specific case. The water rate on third-class freight from New York to Charleston, S. C., is $5.40 per ton; from Albany to New York by water, plus New York terminal charge $3.80; from Albany to New York—by Albany I mean the Albany freight district, west as far as Schenectady and Troy and Cohoes and so forth—by rail plus the New York terminal charge $4.20, making the total charge from Albany to Charleston by water $9.20, and the total charge from Albany to Charleston by water and rail $9.60. The principal part of the cost in hauling between these nearby ports is the loading and unloading. If the rate per ton-mile between Albany and Charleston is made the same as between New York and Charleston the charge would be $6.70. This shows a saving of $2.90 per ton over rail and water rates, and $2.50 per ton over all water and breaking bulk at New York.

It has been determined from an exhaustive study that the terminal charge of water transportation amounts to about 2,500 miles of haul. If this is true the cutting out of terminal charge at New York City brings San Francisco halfway to Albany via the Panama Canal. How will this affect lumber rates from Seattle to Albany? The lumber rates from Seattle to New York via Cape Horn are $12 per 1,000, distance about 15,000 miles. The distance from Seattle to New York by the Panama Canal is about 6,100 miles. Hence the lumber rate from Seattle to New York, including the toll at the Panama Canal, should be about $6 per 1,000. The rate by rail, including terminal charge from Albany to New York, is about $3.60 per 1,000, or more than one-half the rate from Seattle to New York via the Panama Canal. If Albany is made a seaport the rate from Seattle to Albany should not be much more than from Seattle to New York. A similar saving could be shown on other goods.

Col. Black. Just there let me ask you, do you consider the 20-foot depth would make Albany a seaport?

Mr. Barnes. No, sir; I am not taking that position.

Col. Black. You are not taking that stand?

Mr. Barnes. No, sir.

Col. Black. I wanted to get that clear.

Mr. Barnes. Yes, sir; I will state that later.

Lumbermen of Seattle are already looking for a depot for their lumber on the east coast at the completion of the Panama Canal, and why? The lumber rate by rail from Seattle to Duluth is about $17 per 1,000; from Duluth to New York by water $4.50 per 1,000. These rates I say about because the weight of lumber varies, and I have taken the weight per 100, you see, and given my view of the weight per 1,000 feet of lumber.

The probable lumber rates from Seattle to Lake points by the Panama Canal, breaking bulk at Albany, would be about $10 per 1,000, showing a saving in favor of "all water" route of at least $10 per 1,000 to Lake points. The capital district is the natural distributing point for northern New York and all Lake territory points. It is at the head of tidal navigation, and it is the most economical to haul freight in large packages as far as possible. Ample space for cheap handling of freight is afforded at this point. If freight is destined for rail shipment 150 miles is cut off from the rail haul.

This same argument applies also to the southern lumber. There is a great demand for yellow pine all through New York State. I have one letter here that is characteristic of all, showing that the rate now is so high that it makes it almost prohibitive to handle that lumber in this district, where if they can secure cheap water transportation to Albany they believe they can develop a very large trade in yellow pine.

Referring again to the Seattle district, Seattle lumber, one concern tell me that they are now handling at Utica something like 8,000 tons per year of that western lumber, and they have to pay the high rates that now prevail. If this rate can be reduced, as in all probability it can be when the Panama Canal is completed and we get water shipment to this point, that amount will be very largely increased.

Now, as to the amount of freight that may be expected. Calvin Tompkins, commissioner of docks and ferries of New York, said in an address last week, among other things:

"As the centuries have passed the importance of having the greatest of all ports has passed successively from Venice to Amsterdam to London. With the opening of the Panama Canal New York will be the logical point of international exchange of all the world. This is our responsibility. To develop the harbor for its destiny is the responsibility resting upon this city. The work will have to be done, and if we fail to do it the Federal Government will have to do it for us."

New York is already congested as a commercial point, and if it is to reap the benefits to be derived from the completion of the Panama Canal a reachable overflow point up the river must be provided. With the good showing that the water rates make on lumber the amount of business in that line will only be limited by the ability of the West and South to supply the lumber. This will undoubtedly be the greatest lumber mart in the country, and as the Canadian lumber becomes exhausted its place will be filled by southern and western lumber.

What may be said as to the saving in lumber rates applies equally, or to a greater extent, to other commodities. One example in manufactured articles will suffice for all. Let us take a shipment from the General Electric Co. at Schenectady to Charleston. The rail and water rate is $11.40 per ton. Applying the "ton-mile" rate from New York to Charleston to the reach from Albany to Charleston, the charge would be $6.70 per ton. The present trucking charge from Schenectady to Albany is 35 cents per ton. Hence the total charge from Schenectady to Charleston would be $7.05 per ton. The saving to the General Electric Co. if Albany is made a seaport is $4.35 per ton. The traffic department of the General Electric Co. estimates that over-sea shipments from their works would amount to about 30,000 tons per year, hence the total saving to the company $130,500 per year. This capitalized at 3 per cent represents an investment of $4,350,000.

Col. Black. Do they represent carload shipments?

Mr. Barnes. Do those?

Col. Black. The figures of the General Electric—do they send out freight in carload shipments?

Mr. Barnes. No, sir; not at one shipment. That 30,000 represents approximately their eastern, coastwise, and European routes, sold to those points. It does not represent loads.

Col. Black. Then they could not, of course, realize on that unless there were lines from Albany which would take small quantities to those different places direct?

Mr. Barnes. They could not expect to develop trade enough to command a line of boats of their own, of course.

Col. Black. No.

Mr. Barnes. It would have to be handled in packet vessels, the same as is done between New York, Boston, Philadelphia, and Charleston, and so forth.

Col. Black. Yes; so in order to realize that saving, it would be necessary that those lines of packet vessels to the various ports would have to start from Albany?

Mr. Barnes. Albany would have to be one end of their destination; yes, sir; certainly. Albany or Troy, this locality.

Col. BLACK. Yes; this locality.

Mr. BARNES. Yes. If lumber is brought to this port from the Pacific coast, the General Electric Co. and other large manufacturing concerns could return their manufactured goods in the same boats, saving enormously over the transcontinental railroad rates. The transcontinental rate by rail on first-class freight is about $32 per 1,000; lower rates for lower-class freight. The ocean rate on coffee from South American points to New York is $6.36 per ton. The distance from Rio de Janeiro to New York is approximately the same as to San Francisco by the Panama Canal, and, moreover, there is no competition between North and South America by rail and there is across the continent. So it would be reasonable to believe that the rate from Pacific coast points to our Atlantic coast points would be no greater than to South American points, unless possibly it was due to toll at the Panama Canal and the delay in navigation at that point.

Col. BLACK. That is, providing the ocean rates on the two sides are the same?

Mr. BARNES. Yes, sir. I now come to the effects on the railroads. Experience in other cities, both in this country and abroad, shows the enormous increase in business resulting from an adequate water route. Hamburg is a notable example in Europe. Hamburg began to develop her port along about in 1850, increasing it from a 6-foot depth to its present depth of about 8 meters at low water. The commerce of Hamburg in 1870 amounted to about 2,000,000 tons. That I have given in round numbers, as I could not find statistics to give it exactly. In 1880, 4,517,000 tons; in 1890, 7,416,000 tons; in 1899, 13,333,000 tons; in 1907, 20,812,000 tons. That shows the increase in Hamburg's commerce following the improvement of Elbe River. It has cost the city or State of Hamburg 62,000,000 marks to increase its channel facilities from the sea, 85 miles in extent. It has cost, in addition, about 190,000,000 marks to provide harbor facilities after they have made their channel; so that in all the city or the State of Hamburg has spent over 250,000,000 marks to develop a commerce from about 1,000,000 tons to what has now grown to the 20,000,000 tons, and the city of Hamburg has grown from 1882, a population of something like 275,000, or about the same as the capital district, to 900,000, equal to Pittsburgh.

The following is a comparison of five river cities with five lake cities in the United States. In the former class are Pittsburgh, Cincinnati, Louisville, St. Louis, and Memphis, and in the latter, Buffalo, Cleveland, Detroit, Milwaukee, and Chicago.

In 1870 the population of the five river cities was 754,000. In 1910 these cities had increased to a population of 1,940,000, the rate of increase being about 158 per cent.

In 1870 the population of the five lake cities was approximately 660,000, this being 94,000 less than the population of the five river cities at that date. In 1910 the total population of the five lake cities was 4,009,000, the rate of increase for the lake cities being 507 per cent, or more than three times the rate of increase of the five river cities.

In 1870 St. Louis was larger than Chicago. A few years later Chicago became her rival and has now entirely outclassed her and has become the most important city of the interior. St. Louis will soon be outclassed by Cleveland and Detroit. Cincinnati was for years the largest city and most important commercial point in Ohio. She has now been outclassed by Buffalo, Detroit, Cleveland, and Milwaukee. Pittsburgh is apparently an exception among the river cities, but this is due to her exceptional natural resources. She is now greatly exercised over the growing competition in her chief industry in the new lake city of Gary, a suburb of Chicago.

The enormous growth of these lake cities has resulted in a congested condition of their railroad terminals. The railroads touching the lake cities and other important water highways are the most important in the country. It is believed that the development of this point as a seaport will be of great beneficial effect on the railroads meeting at Albany. Imported goods discharging at this port and destined to western points will be placed 150 miles beyond the reach of the Pennsylvania and Baltimore & Ohio Railroads. The New York Central and the Delaware & Hudson Railroads can afford to give Albany preferential rates.

That brings up again the question of the rate structure. The seaboard towns, as Mr. Jones has mentioned, enjoy what is known as the ocean-rail rates, and the ocean-rail rates are 10 cents per 100 less than the all-rail rate from Chicago to New York or New York to Chicago. Boston and New York and other seaboard towns enjoy that rate. Albany does not. If Albany can secure that rate it will mean that a large amount of the freight that is handled at these other towns and destined for our great West can come to Albany as a seaport where harbor facilities will be much cheaper than New York and relieve the congestion at that point, and this is the natural point for such a distribution line than to a point south, not only for rail shipments but because of the natural water transportation from Albany to the West. At the completion of the barge canal we will, of course, have our 12 feet as far west as Buffalo and Oswego. Then the Great Lake system will distribute to all the great Northwest. So that there seems no argument against the statement that Albany is the natural overflow from

New York rather than to go to Philadelphia, or Boston, or Baltimore, or some point south.

Another point in this connection, we have a large iron mine upon Lake Champlain which has tried to increase its output to 1,000,000 tons per year. They have not, as I understand, quite reached that. They hope in the near future to have developed that to 1,500,000 tons. Ninety-five per cent of that is now handled by rail. If we can secure depth in the tidal Hudson sufficient to make this a seaport town, there is no reason why this river up as far as Troy can not be kept open all winter. That is impossible under present conditions or with the present project now in force. Although the present project might be sufficient for a certain class of vessels, during the wintertime if we undertook to crush the ice and put it under the vessel you see at once that the vessel would be grounded.

Col. **Black.** Oh, I think it is perfectly feasible to keep navigation open here now.

Mr. **Barnes.** It might be for the light craft, but if you are going to use a craft of 12 feet and you have only got 12½ or 13 feet, and if it wanted to crush 2 or 3 feet of ice and put it under it, as is the method by ice crushers, it is certainly going——

Col. **Black.** I do not agree with you at all, Mr. Barnes.

Mr. **Barnes.** Well, doctors must disagree. The Witherbee-Sherman people, if we have channel enough so that they can keep the channel open all winter, could ship their iron ore to Albany and thence by boat to New York during the closed season of navigation, amounting to four or five months in the year.

Col. **Black.** That is very important; a very important question.

Mr. **Barnes.** And it will develop a very large freight at this point.

PROJECT.

If this is to be made a seaport, what shall the channel dimensions be? The Great Lakes are being improved to a 21-foot depth. The standard depth adopted for the intercoastal canals is 25 feet at low tide. If I am mistaken in that, I wish you would correct me.

Col. **Black.** Just what the depth of the intercoastal canal will be nobody knows. The board on the portion from Boston to Beaufort Inlet has recommended different depths for different sections, and I understand that the board from Beaufort Inlet south has recommended still different depths, so that I am not at liberty to even tell what the Beaufort Inlet board has recommended, because it has not been reached as yet.

Mr. **Barnes.** I want to make a suggestion that you get those boards together and see if they can not adopt a standard.

Col. **Black.** I think you are decidedly correct.

Mr. **Barnes.** Yes, sir; the dimensions of canals throughout the United States is a hit-and-miss affair.

Col. **Black.** I think it is a most unfortunate affair that New York has adopted so small a standard. It would have been better to have adopted the same standard as Canada has, but New York has adopted a standard, and I am afraid we must abide by it.

Mr. **Barnes.** Hamburg, on the Elbe River, 85 miles from the sea, has a channel improved from 6 feet deep to 26¼ feet (8 meters) at low tide, of 650 feet width. Hamburg is just now starting on a project to increase the depth 1 meter with the expectation of a further increase to 10 meters at low tide.

The writer has adopted a project calling for a channel 21 feet deep; 600 feet wide up to Staats Landing, near Van Wies Point; 400 feet wide to Patroon Island (north Albany); and 300 feet wide to Troy. The unit prices assumed are somewhat in excess of those prevailing for similar work on the barge canal. The quantities are taken from the best available information obtained from Government surveys.

In this connection as to unit prices, barge canal prices estimated by our engineer force has been 15 cents per yard for hydraulic work, and our quantities are relatively small when compared to a project of this magnitude. Our largest contract in hydraulic work is somewhere around 4,500,000 yards. Invariably our contractors have underbid our estimates for that class of work as much as 10 or 15 per cent. The last contract let on hydraulic work—our estimate was a composite estimate, you understand how we are making it; we do not have any classification, but for hydraulic work which predominated in this contract our estimate was 15 cents. Then we had rock at $2.25, hard dipper work at 50 cents, and so on. Our composite price—I am speaking from memory now—was 27 cents. The contract price was 21 cents. The contractor has been doing hydraulic work during this last season, at a cost, from our records, of about 3 to 3½ cents per cubic yard. He has been excavating very largely in material running from 8 or 10 feet in depth down to nothing. His contract requires that he shall carry on his work on four different elevations, locks intervening. The locks are not in each contract, and he must either build new equipment for his location or wait until some other contractor has completed the locks, so that he can put his machinery through to those locations. Those conditions are worse than I would expect you would have in the Hudson River, where you would have large quantities and open-sea communication. So that you can get competition beyond New York.

By the way, our plants must be built on the site of the work. We can not transport them, can not bring them in from other places; they must be built there and scrapped there, and the whole plant must be charged up to our work.

Col. Black. That continues indefinitely for maintenance too, doesn't it?

Mr. Barnes. Yes, sir. And another point, by the time that you are ready with your seaport project, if you will give us that, our contractors will be ready to compete for this work. We have probably six or seven contractors in that class of work now who would be eager for this work, inasmuch as they have their plants and we will have our locks completed so that they can get their equipment right down to the tidal Hudson.

Col. Black. Except for the bridges.

Mr. Barnes. They can go under the bridges because they can dismantle them——

Col. Black. Tearing right down to the hull, practically?

Mr. Barnes. Yes; take their upper work right off, but their equipment is there. It simply means tearing it to pieces and taking the hulls down.

Again, as to unit prices, the board of engineers who reported on the Ohio River project, as I can gather from that document, have estimated the cost of hydraulic work at 15 cents, the same as done here on the New York State canals, and their depth runs about 6 feet—from 6 feet down. So that they won't have as great a face to work on as we would have in the Hudson. Of course, the depth will run down to nothing here, but it runs to a greater depth than 6 feet and a greater width than they have in the Ohio River.

From the above data the cost of such a project in excess of the money now available for the present project is $10,000,000. To increase the depth to 25 feet standard with intercoastal would require approximately $6,250,000 additional, making for a 25-foot depth, which I respectfully recommend, a cost in addition to the present money available of something like $16,000,000 for the channel as far north as Troy. This is only about 7 or 8 per cent of what the State of New York is doing now to develop the natural resources and the commerce of New York. We are bringing the commerce to the tidal Hudson and asking the General Government to spend about 6 to 8 per cent of what we are spending to carry on this commerce with the coastwise commerce and with foreign lands.

If you find by your deliberations that the present project is not adequate for present craft, but that 14 feet is, then the cost of making that additional 2 feet is placed at about $4,000,000 more. Hence the amount to be charged against a ship canal 25 feet deep at lowest low water is approximately $12,000,000. The interest on this amount at 3 per cent is $360,000. If you choose to use 4 per cent it would be $480,000.

If the only saving that will result from the expenditure of this money is the terminal charge at New York of 80 cents per ton, and the present difference between rail and packet freight by water of 40 cents per ton, or a total of $1.20 per ton, it will require only 300,000 tons of over-sea freight to pay interest on this amount.

Time has been too short to make a complete canvass of the business of this district to determine the local over-sea commerce, but sufficient has been found to warrant the statement that there is enough local business to justify the necessary expenditure. Letters from a few dealers are submitted herewith and others will be submitted as received. However, it is respectfully urged again that this is not a local question, but is one of far-reaching importance, and something more than local business should be considered.

The writer has been ably assisted in collecting these statistics by Mr. J. Y. Reid, chairman Albany City Planning Association.

I want to read one or two of them and to present what I have and ask that if others come in within a few days we may be permitted to present them. Mr. Hawley Kendig, treasurer of the Seneca Falls Manufacturing Co., is present, and will probably make a statement for the Seneca Falls Association. If he does not make a presentation now orally he has promised me that he will present his statistics in writing in a formal manner, so that they may be presented as others are and as they should be.

Here is a letter from the Helderberg Cement Co. which is characteristic of shippers of these heavy commodities.

(Mr. Barnes read letter from the Helderberg Cement Co., transmitted herewith.)

Mr. Barnes. A letter from Jared T. Newman, of Utica, advocating strongly the making of Albany a seaport town. They do a very large business in heavy commodities of cement, salt, gypsum, etc., and they feel it is of great interest and importance to them, and he strongly urges its adoption.

Here is a letter from Phoenix, a lumber dealer dealing in lumber—pine—who states that it is almost impossible for him to develop a business in that line owing to the excessive rates, but if he can get this lumber to Albany by seagoing vessels and thence over the barge canal he feels that he can do a very large business in central New York. He is doing a very handsome business now in that line, not only in yellow pine but in other lumber products, but yellow pine he wants to make his specialty.

I do not think it is necessary for me to take your time in further reading of these letters, but they will be submitted for what they are worth. Summarizing now:

(1) It is believed that the present project is inadequate to safely handle the present commerce.

(2) It is believed that a large amount of freight is diverted to railroads owing to inadequacy of channel and harbors.

(3) An increase of 2 feet in depth without a large increase in width is not sufficient for present needs.

(4) The commercial importance of this district will be greatly increased upon the completion of the State's project.

(5) The terminal charges in New York are high and will probably increase as the port becomes more congested.

(6) The completion of the Panama and intercoastal canals will add very largely to the importance of this district as a port.

(7) The making of this district a seaport will benefit the railways entering Albany.

(8) The question is one of national importance, and if a seaport project is approved it will be of incalculable value, not only to this district but to the country at large.

(9) The present commerce will warrant the expenditure of money to create a ship channel 25 feet deep.

Col. **Black.** Mr. Barnes, you are going to add a little to that very interesting paper of yours, are you, before you submit it?

Mr. **Barnes.** I have that table to add, and if I get other statistics that are of interest I want to comment on them and forward them. I am going to send you the statistics as they are submitted, at any rate. I have written about 80 letters to lumber dealers all over the United States and only got those off last week. I have a few yet to write, and have only heard from one or two of them, and if there is anything develops from that source I want to submit those letters.

Col. **Black.** In submitting your commercial statistics it would be a very great assistance if you could show how much of them are to a single destination in shipload lots, bringing up that same question that I asked you before, because it is very manifest that a man may make very large shipments, but if they are very scattered he must seek the lines of boats for the points to which those shipments are intended.

Mr. **Barnes.** I may answer that for one commodity now; that is, for lumber, and for the Seattle lumber or western coast lumber.

Col. **Black.** What type of bottom does that come in?

Mr. **Barnes.** That ought to come in bottoms that would reach here on our 25-foot draft. Twenty-five feet at extreme low water means 29 feet probably at some time during the day, and as lumber is a slow-moving commodity they could wait for the tide for the few miles between Albany and Hudson to accommodate themselves to the high tide rather than to the extreme low tide. The commerce in that line is beyond our imagination. The Great Lakes and northern Mississippi district and northern New York and part of the New England States are all tributary to Albany as a shipping point—to Albany in the summer time when our canal system is open and to Albany in the winter when we have rail shipments to all these points—so that Albany is naturally the point to discharge those cargoes, and those are the full cargoes that you are speaking of. They will come here undoubtedly in full cargo shipment. New York, as you know undoubtedly, is so congested that you are doing well if you get advantages there at all at any price. These shipments would naturally seek points farther up the Hudson. There is no use of their stopping at points between Albany and New York, as I have shown those points are not distributing points; they do not have the railroad facilities, they do not have the rich territory surrounding them that will make them distributing points. So naturally they must come to this point as the point of distribution. Oh, the commerce in that line may mean 1,000,000,000 feet, a great many times more than enough to pay for this project.

Those boats, as Mr. Kelley, from the Helderberg Co., has stated, will return in a large part light. If so, they are going to want to take something back for ballast rather than to take a water ballast. The possibilities are, or the probabilities are, that they will develop a large trade in such heavy commodities as cement, iron, salt, and gypsum, etc., from this locality, not necessarily from this one point but from northern New York, that will go out in shipload bulk or packages.

It is very doubtful if the manufacturing industries in this locality at this time or within the next few years will develop a commerce that can be carried in shiploads. That may be said of every other seaport on the Atlantic, that they do not do a business in shipload goods only in, well, I am going to say, in a secondary way. They do a great packet business. They also do some shipload business in bulky commodities.

Col. **Black**. This carload carriage around New York is just because of that?

Mr. **Barnes**. Just because of that; yes. Now, as an example of what a boat is likely to take from a seaport I want to read what is among the articles shipped in one ship from San Francisco, and while I read that the business men in this locality can think what part of that or proportion of that they can develop from this locality. That ship carried on its way to Honolulu and Yokohama and other Asiatic points bicycles, books, steel bridges, building paper, canned meats, canned oysters, castings, cedar poles, cigarettes, condensed milk, copper ingots, cotton goods, drugs, electric machinery, flour, furniture, hay, lead, locomotive, malted milk, nails, oats, paints, paper in bales, peanuts, piles, iron pipe, potatoes, railway car, fruits, salmon, and spices.

The point I am making is that it is not necessarily a port carrying on cargo shipments of one commodity. It is a packet business the same as the New York port or otherwise.

Col. **Black**. Much obliged, Mr. Barnes. There are some other questions I would have liked to ask you, but I am told there are two gentlemen from Buffalo who have to leave very promptly.

Mr. **Jones**. Mr. Charles Heald, representing the Chamber of Commerce of Buffalo.

Mr. **Edward F. Murray**. Then may we be permitted to submit our views in writing?

Col. **Black**. Much preferred, because, gentlemen, these things will all go on to Washington to the board of review, and they will see them much better in writing than they can the other way. I think it would be probably preferable.

Mr. **Heald**. Mr. Chairman, I feel rather embarrassed in pretending to represent the Chamber of Commerce of Buffalo before you to-day in view of the remarks you made that you wanted the speakers to confine themselves to the question as to the importance of the deepening of the Hudson River beyond the present depth of 12 feet.

Col. **Black**. Yes, sir; that is the only question that we can consider.

Mr. **Heald**. Yes, sir; so that I am not prepared, not having been asked to come here until Friday afternoon, I am not prepared with any statistics, sir, or to speak directly to the question at issue, and I could only speak in a general way in reference to the importance of the deepening of the Hudson River, looking to it as a factor for the general increase of commerce due to the development of waterways in general, and as that is not pertinent directly to the question I think you will pardon me if I will not go into that detail and be obliged to me for not doing so.

Col. **Black**. Well, you know better. The question is to get any argument that may be submitted to Congress which will show the necessity of deepening the Hudson River to-day to a depth greater than 12 feet at all stages.

Mr. **Heald**. I appreciate that, sir, and I have been sufficiently familiar with the working of affairs in congressional halls in Washington to know that the matter that is considered of gravest importance, the work that is done there, is not the work that is evolved from the man who stands upon his feet and is listened to by probably 5 or 6 out of the 350 who are supposed to listen to him, but it is the work that is done in the committees and the work that is done through the evolution of the mind rather than the evolution of the tongue. So that under the circumstances I do not feel qualified to go into the details of it necessary to be of any value to you at this time.

I simply would like to make this remark: That I probably occupy a unique position, not from the fact that I have been in the transportation business from 1871, but the fact that I have occupied both the rail and the water situation, and I can speak from both points. I know from my experience in the different localities in which I have worked, as I have been a working rather than a talking factor in transportation, that the railway managers in general all over the country, and especially those who are operating the railways connecting with the Lake ports with which I am now connected, favor the development of the waterways rather than oppose them. There is a general idea abroad that the railway managers oppose them. They do oppose them because of the lack of harmony that exists between those interested solely in the development of waterways, not because of that development but because of the irregularity of that development, which would tend to impede rather than develop the work by the general condition of the country.

It goes without saying, sir, I think, that this country is growing faster than the railroads can possibly take care of it. The railroad managers recognize that fact, and they not only do not stand in the way, but they propose to help all that they can the development of the waterways, for it is a point that can not be disputed that every city of any prominence located on the Great Lakes and elsewhere where there are railways have been improved more—the railways have profited more, I mean, by the development of those cities from the waterways than they have from their own; and it is a combination of the two that will lead to the great development of this country which we are all looking forward to.

And it also, I think, goes without saying that the sooner the Hudson River is deepened so that the coastwise vessels can reach here intact with cargoes that they bring to New York the greater will be the development of the country, the greater will be the development of the country inland from here west, the greater will be the improvement and the improvement in the carriage by the railways from here west, the greater will be the development of the country all over through which the railways traverse today; and that can be said in reference to all the waterways in this country.

We are too great and too grand a people, we have too great a country here to try to limit it to transportation ways by rail alone or by water alone. We have both of them and they both should be equally developed, and I can merely say, sir, in connection with this I will be very glad to present to you later on in writing some statistics, if it is found desirable to do so, but I am not prepared at this short notice to present them, and I would be misrepresenting rather than representing the Chamber of Commerce of Buffalo if I should attempt to do so offhand.

I feel that in saying that the city of Buffalo stands ready, realizing from our own experience there and from my experience in being the president and manager of one of the largest package freight lines on the Lakes, having been in the past the president of the Pere Marquette system in Michigan, where I dealt with inland or local conditions, and having been prior to that the traffic manager of the Long Island Railroad for a number of years and located in New York Harbor and being familiar with the conditions there—that the chamber of commerce stands ready to-day to cooperate with and do everything that they can towards bringing about this improved condition for Albany and Troy, or the Albany district, so called, believing that in doing so they will improve not only the general conditions existing locally here but all over the country, not confined to New York State alone but even out as far as the coast.

Col. **Black**. Mr. Heald, as a railroad man and a water man both, you would help your friends here in Albany and the project very much if you could show clearly the advantages to the United States in general of deepening about 39 to 45 miles of river at an expense of some, say, $20,000,000 or whatever the figures are, rather than making other improvements for that. Taking into consideration the condition to Hudson as an estuary, for instance, of the Hudson where deep ships can come now, whether it would be the most advantageous to the people of the country to spend the large sum necessary for carrying that improvement simply to a point, say, 39 or 45 miles beyond, or whether it would be better to spend the money or a portion of it in developing other means of overcoming that short distance.

Mr. **Heald**. I appreciate the point you make, sir, and I will endeavor to get those statistics for you if it is within my power to do so. I will be very glad to cooperate, as a representative of the chamber of commerce at this time, with the Chamber of Commerce of Albany, to that effect. I thank you, sir.

Mr. **Jones**. Senator Henry W. Hill, Buffalo.

Senator **Hill**. Col. Black and gentlemen of the Albany Chamber of Commerce: I come here also as one of the representatives of the Chamber of Commerce and Manufacturers' Club of Buffalo to say a word in favor of the proposed improvement of the Hudson River. We have not been instructed, however, to approve or disapprove of any specific depth of water in the Hudson River, because our chamber of commerce was not advised as to what was proposed. But in a general way I think I am safe in saying that we are heartily in favor of such improvement as you in your judgment and the good people interested in this matter may think proper to answer the demands of the commerce of this district and also of the State.

You are undoubtedly familiar with the fact that long before we had an Empire State, I think in 1614, a trading port was established in this vicinity for the transfer of freight from then ocean-going vessels of moderate draft, of course, to canoes and other means of transportation for the interior of the State, and since that time the Hudson River has been growing in importance, not only as a waterway for the State but of the Nation, until its tonnage has become large enough, we believe, to warrant such expenditure of money as has been proposed in the further deepening of the channel from Troy, the waterway to Hudson.

In this connection let me say one word with reference to the possible increase of tonnage that will be tributary to this port from the west. The annual tonnage of the port of Buffalo now is approximately 14,000,000 tons. Occasionally it has been more, but, I think, this year it will not be far from 14,000,000 tons—that is, the lake, the water-going commerce. The rail commerce, of course, is very much larger. It is believed that with the completion of the barge-canal system the water-going tonnage at the port of Buffalo may be increased from 10,000,000 tons upward. We do not know just what the limit will be, but, assuming that it will increase 10,000,000 tons, which is perhaps more moderate, which would come through that port to Albany, you would have then the large receipt of tonnage of the port of Buffalo, the water-going tonnage, coming through the Erie Canal to this port and augmenting the commerce of this port. If the tonnage so received were 10,000,000 tons additional to what you have here from this district and the saving be 50 cents a ton from this port to the Atlantic seaboard ports, you will have, you see, a saving of something like $5,000,000 per year on the cost of that transportation, which would pay the interest on the indebtedness and create a sinking fund to discharge the bonds which would be necessary to issue to care for this improvement. Now, I do not think that is very far from what you will find may be the result of the improving of the upper Hudson. I should expect that it would augment very materially the tonnage through the State by the completion of the barge canal and that it would not only benefit Albany but it would benefit all the Hudson River; that Troy, which I assume is in contemplation in this improvement quite as much as Albany—that Troy and Albany, being then ports sufficient to accommodate coastwise trade, would receive this western tonnage in so much larger quantities than it receives it now or than it may receive with the completion of the barge canal that the saving on the freight rates to the people of this State and of this country would warrant the expenditure.

In answer to the suggestion that you made to the preceding speaker, Mr. Heald, let me say that not only is New York interested but seven great States bordering on the Great Lakes are interested in this proposed improvement. This State of New York receives and contributes to the General Government from 8 to 10 per cent of the cost of the Government. These seven States will very nearly aggregate 50 per cent of the revenues received by the Government, and, therefore, the people of these States recognize that they ought to have such reasonable expenditures for waterway improvement as will answer the demands as are made upon them for cheap transportation for their raw material and finished products to the sea.

I was very glad to hear the statement made by Mr. Barnes as to the lake tonnage. Much of that increase will come, and it is coming naturally, of course, through this State; and I assume, Col. Black, that the local tonnage, which is now over the Erie Canal, about two-thirds of its entire tonnage will be very materially augmented, so that what Mr. Heald has said in reference to railroads will be true with reference to the increase of towns all along this interior waterway, and instead of the railroads being injured they are going to be materially helped.

Let me cite one instance. We have just outside of our city, the city of Buffalo, where 10 years ago there was simply some vacant land that was not productive enough to pay the taxes, a city of 25,000 in population known as Lackawanna, constructed by reason of the demands for a population and equipment to care for the great steel plant, which occupies a position that was before simply vacant and waste land. Now, one can readily see—it requires but a moment's reflection to see the immense value that town has been to the railroads tributary thereto. Even though the raw products shall come down the Great Lakes and the finished products were all transported by water, the higher class of freights, merchandise, and passenger service, and so on, would far exceed whatever loss there might be incidental on the failure, for instance, of their railroad to carry the finished products through the state on the barge canal. So that I think that the railroad managers are becoming rather reconciled to the improvement of our interior waterways, and they expect that they are going to receive large increases in freights in the amount of tonnage and in other ways, so that they are going to be benefited rather than injured by the proposed waterway improvement.

But more than that, even though they will not receive such, it has become a matter of necessity with the railroads of this State that they have the advantages which come to them indirectly over other trunk line railways running from the interior to the sea and thereby be able to use the water-route rate as an argument why their rate should be low enough to compete therewith. Otherwise the tonnage, as you know, will be diverted and is being diverted to other ports of the country. Now, that may not be an argument why the Government should expend this money, but it is an argument why New York State urges self-preservation by such expenditures as are proper and right for this improvement.

Allusion has been made to what New York is doing. In the recent Rivers and Harbors Congress there seemed to be general gratification over the fact that New York had not only bonded itself to expend $108,000,000, but that it had recently voted to expend $19,200,000 more. Instead of there being any opposition, that great convention of 3,000 and more delegates were rather gratified to know that New York had gone one step farther; and I do not apprehend that the Congress of the United States with the influence that that association has, the interest which they have in water-going commerce, will be at all reluctant at making such expenditures for the Hudson as may be necessary to accommodate the tonnage at this port and that will be necessary to be expended in the near future. I think a resolution could have been passed, if it had been brought up by our friend, Mr. Jones, committing the National Rivers and Harbors Congress to such expenditure as may be necessary to improve the Hudson, were it not for the fact that that organization does not ordinarily commit itself to any project, but the sentiment seemed to be almost unanimous in favor of the improvement of the Hudson River to such proportions as you and other gentlemen may think necessary to meet the demands of commerce. It is so small in comparison with the ordinary budget of the river and harbor bills that I do not believe there will be any great objection on the part of any one to the insertion of such an item in it.

I hope that the improvement will go as far north as Waterford. I do not know just what draft will be necessary in order to accommodate them, but I hope the improvement will go as far as Waterford.

Col. Black. The State of New York is against that now.

Senator Hill. Yes; I hope the State of New York will be reversed. I am frank to say that. The Government of the United States ought to go as far north as you can make navigable water in the Hudson River.

An allusion has been made to the condition of the interests along Lake Champlain. We have large interests there. The upper end of Lake Champlain has got to be deepened, and that is a national waterway under the control of the United States Government, and I assume that in the near future something will be done perhaps in that direction. I do not know, Col. Black, but they may have seen you on that subject. I know in Washington there was some talk about the matter, and there seemed to be a great deal of interest, and we New York people are interested in the improvement also of the upper end of Lake Champlain. Then you will have not only—that will be an added reason why the Hudson River should be deepened so that the tonnage to Lake Champlain coming through the New Champlain Canal will also have a cheaper outlet from this point on. And that is an absolute necessity, because as soon as the barge canal is completed through to Whitehall the barges will not be able to navigate Lake Champlain until the upper end of Lake Champlain is improved.

I have digressed just a little because I wanted to take occasion to allude to that, and think upon examination you will see that something has got to be done in that direction.

Col. Black. I am very familiar with that, sir.

Senator Hill. I do not know that that is within your province.

Col. Black. Yes; that is my district. I have gone into that more or less.

Senator Hill. I am more or less familiar with that. I was born and brought up on Lake Champlain and know something about the interests there. Now, Col. Black, I think that we, without specific instructions, are here from the western end of the State to indorse whatever is thought best in your judgment and in the judgment of others to do in the way of improving the Hudson, and I think that we can secure such assistance from the Members of Congress in western New York as will carry out your recommendations.

Col. Black. Thank you.

Mr. Jones. Mr. S. W. Huff, of Waterford.

Mr. Huff. Col. Black and gentlemen: I like to hear the term "Albany" used, but I like to hear the term "Albany district" used better. I am here as secretary and representing the Chamber of Commerce of Waterford, N. Y., the oldest incorporated village in the State of New York, which went to sleep several years ago when New York State put a fence across the Hudson River just below us. Tide water used to go to Waterford. Waterford used to be the head of navigation for the Hudson River, but that fence put us asleep, and we have been waking up a little, and we recognize that the interests of Albany are our interests; that the interests of Troy, Cohoes, Green Island, and Watervliet are our interests. We recognize that any improvement in the traffic conditions of the Hudson River are a benefit to us.

But it strikes me that the question which is before us here is not so much what will be the local benefit of the deepening of the channel in the Hudson River as what will be the benefit of such work to the Nation at large. It is a recognized fact that the eastern portion of our country is the industrial section of the United States; that here is where the congested conditions of population exist; here is where the raw material must be brought from the West for manufacture, because we have the coal here, we have the power here, we have the population here to consume it; and, therefore, anything which tends to benefit and cheapen the cost of transportation will tend to benefit the country at large in that it reduces the cost of living.

One reason, I believe, why this should be done is the fact that we have here in New York State a tremendous amount of water power undeveloped which is being developed by which electric power will be generated and is being generated to turn the wheels of industry, lessening the cost of power, etc. There is no doubt in my mind but what this district here is destined within the very near future to become the great industrial center of the Union, due to the fact that just north of us here, just north of the natural end of navigation of the Hudson River, we have the richest deposits of iron ore known in the United States of America; we have water power going to waste in this section which is more valuable than the output of coal in the State of Pennsylvania, and this water power, as I say, is being developed.

In the city of Cohoes, which is just across the river from Waterford, we have a great industrial community, the wheels of which are being turned almost entirely by water power taken from Cohoes Falls. It has been estimated, I understand, that owing to the antiquated patterns of water wheels, hydraulic machinery, that are being used 60 per cent of the actual capacity of the power there is going to waste every year. A movement is on foot to electrify the power plant, which will increase thereby the output of the power there by 60 per cent, which will result in an immediate increase in the manufacturing industries of that community to the same extent. Now, these people have got to have some means of getting rid of their product in an economical manner, and anything which will improve the water transportation of this community will improve that.

Another question of very vital importance entering into this proposition, I believe, is the fact that to-day a large portion of the lake traffic of the Great Lake system—our wheat, our grains—are leaving this country not by way of American ports but by the way of Canadian ports simply because of the congested condition of New York Harbor. This results in turning a tremendous revenue over to the Canadian Government which rightfully belongs to us and which would be diverted to our own ports if we had means of properly handling it.

Speaking again of the matter of power, here we have here at Little Falls a lot of undeveloped power, Glens Falls, Port Edward, Spier Falls, etc., which will soon be developed and which will result in an increase in the industrial use of this section of the country and which, of course, will result in the advance of the commercial interests of the country at large.

I was very glad to hear Senator Hill speak relative to the proportion which New York State is paying of the expenses of the Government, and the fact that we are paying so large a proportion causes us to feel that perhaps we have not had a due proportion of the appropriations made by the Government for the improvement of the waterways of the country, and I am very much in hopes that when this comes to a final settlement with whatever may be adopted that this channel will be extended as far as Waterford.

Albany has very few available factory sites that can be acquired at a reasonable figure near the water lines. Just north of Albany between here and Waterford there are some; Green Island has a few, but I believe it is recognized by the business men of this community that the best factory sites, industrial sites, in this section lie just north of Waterford between Waterford and Mechanicsville. At the present time we have industries in Waterford employing more than 2,500, and it is necessary in order to gain the advantages of water transportation to cart all that stuff either to Troy or—yes, practically all of it through to Troy. The valve people handling heavy casting, etc., have to carry that some 6 or 7 miles to get up where they can ship from Troy.

Now, just above Waterford the Hudson River takes quite a rise. In coming down, of course, it drops. There are rifts just above Waterford. There is the natural end of navigation of the Hudson, and if that fence that put us to sleep 20 years ago or more had not been built there would to-day have been the head of navigation, and we believe that inasmuch as it is the natural head of navigation that when this artificial work is done it should extend at least to Waterford, where the manufactories of that part of this great Troy-Albany district can have the advantage of the shipping facilities at their door.

Now, we have no quarrel with Albany or Troy or any of these cities here; we are brothers in this great movement; but we do feel that Albany will lose nothing by extending the channel up to Waterford; that Troy will lose nothing; and that, on the other hand, Waterford is where the Champlain branch and also the Erie branch of the barge canal system of New York State drop into the Hudson River. It is the natural place for the termination of this deeper channel in the Hudson River, and we trust that when the Federal Government finally decides upon this it will extend this channel as far as Waterford.

Col. BLACK. What depth are you speaking of, please? To what depth would you advocate the bringing of the channel?

Mr. HUFF. I should advocate the same depth that is carried out throughout. The matter of the 20-foot channel or the 12-foot channel, as far as I am personally concerned I have not investigated it thoroughly enough so that I am qualified to answer that question. This thing was sprung upon me suddenly; I knew nothing of this hearing until Saturday, when I received a telephone call announcing it and asking me to be present. I have not looked it up far enough. I should be very glad to look it up further and to submit statistics, etc., later, if it seems to be desirable to do so.

Col. **Black**. There will be a matter of 10 days, anyway, I imagine, which you would have, because the gentlemen of Albany are not quite ready, before the report is submitted, and we would be glad to receive anything in writing from you that you wish.

Mr. **Jones**. Mayor M. D. Hanson, of Cohoes.

Mr. **Hanson**. Mr Chairman, I represent the city as well as the chamber of commerce of the city of Cohoes, and we are heartily in favor of the deepening of the channel as the project has been put forward by the Albany Chamber of Commerce and our friend from Waterford. We also believe that the channel should extend to Waterford. We have a large project there for manufacturing on the banks of the Hudson River, which is cheap property and which the chamber of commerce has secured, so that there is about two hundred and sixty odd thousand tonnage shipped from and to Cohoes a year, and we believe that the deepening of the waterway would materially reduce the freight rate to our manufactories in that city, and with the electrification project which is now going on there or expected to go on very favorably, why it will be a large site for more manufactories than we have there at the present time, which is the principal industry; the cotton and woolen goods is the principal industry of the city. And we are heartily in favor of the deepening of the channel for the benefit of the upper part of our neighborhood.

Mr. **Jones**. Mr. L. Murray, of Albany.

Mr. L. **Murray**. We ship sand, and I was called last night and asked to come here and explain our export feature of it. We export about 800 tons a year, mostly to northern Europe. It has to be packed here in sacks and reshipped in New York. Of course, the expense of handling it is 100 per cent higher than it would be if it could be shipped directly from here to Europe. Of course, we also ship a lot to Nova Scotia. There is no question in my mind but what if we could load it in ships right here, in place of shipping 800 tons a year we would ship a great deal more.

Col. **Black**. What ports of Europe do you ship to?

Mr. L. **Murray**. Pulaski.

Col. **Black**. Then in order to obtain the benefit of that you would either have to ship in shiploads or in other vessels that would go to Pulaski?

Mr. L. **Murray**. Yes, sir; I haven't any figures on this. I just thought you would possibly be interested in this export item. We also export to Mexico and points down in South America, some quantities.

Mr. **Jones**. Mr. Hutton, of Troy.

Mr. **Hutton**. Col. Black and gentlemen: I represent the chamber of commerce, gentlemen, as secretary, and also the business men of Troy who are not members. Mr. Barnes was to Troy two weeks ago and gave us quite an interesting talk. We became enthused after his talk, and thought we could see our way clear on procuring just as much of an improvement as Albany. He has changed it now to the Albany district. I hope Troy will be included. The Albany district was not mentioned any during the evening.

I have been instructed, gentlemen, at the last meeting of the chamber of commerce, to wait upon some of our business men and manufacturers. I report the following:

In complying with the request of R. D. Black, first lieutenant Corps of Engineers, United States Army, made to the chamber of commerce, Troy, N. Y., in date of December 11, that the United States engineering office in Albany, referring to the question of securing increased depth in the Hudson River in connection with the preliminary examination and survey of the river with a view to securing said increased depth ordered by the river and harbor act approved June 25, 1910. In calling for a hearing at the common council chamber, City Hall, Albany, N. Y., on Monday, December 18, 1911, at 10 o'clock a. m., stated that district officer, Col. W. M. Black requested that parties interested in the navigation and commercial use of the Hudson River appear in order that full advantage may be taken of the opportunity to present all statements and arguments in connection with the proposition of securing increased depth.

Attention is called to the fact that the Hudson River is now being improved under a project which calls for a depth of 12 feet at all times of the year and a channel width of generally 400 feet. The question to come before the hearing relates solely to the advisability of securing a depth greater than that to be provided by this project. The new improvement was thoroughly discussed at the regular monthly meeting of the chamber of commerce, Troy, N. Y., held Tuesday evening, December 12, and the officers, directors, and chairmen of standing committees were unanimous in expressing their opinions that the contemplated greater improvement of the river would be of great benefit to the manufacturers, shippers, and business men in general of the city. The secretary was instructed to visit and interview the principal manufacturers and shippers for the purpose of obtaining their views on the subject matter.

Mr. William J. Bradley, superintendent of the Rail Joint Co.

Mr. William Henry Warren, Fuller, Warren & Co., stove and heating manufacturers.

Mr. Harvey S. McLeod, president McLeod & Henry Fire Brick Co.

Mr. Henry S. Darby, secretary and treasurer, J. M. Warren & Co., wholesale and retail hardware dealers.

Mr. F. F. Peabody, president of the Cluett, Peabody & Co.

Mr. Alba M. Ide, president of G. P. Ide & Co., collar and shirt manufacturers.

Mr. Martin J. and George A. Straub, of Emigh & Straub, collar manufacturers.

Mr. W. Nelson Ells, president Tim & Co., collar and shirt manufacturers.

Mr. Thomas F. Fitzgerald of the Fitzgerald Brewing Co.

Mr. James H. Caldwell, president Ludlow Valve Co.

Mr. Frank P. McCarthy, secretary of Troy Waste Co.

Mr. W. Irving Johnson, Cluett & Sons, pianos.

Mr. John J. Ryan, president and general manager United Shirt Co., collar and shirt manufacturers.

Mr. Joseph McKay and John P. Schad of Hall, Hartwell & Co., shirt and collar manufacturers.

Col. James M. Snyder of Earl & Wilson, collar and shirt manufacturers.

Mr. G. F. Bond of the B. Cooper Ice & Coal Co.

Mr. Thomas C. Boswell of the Aird-Don Co., steam fitters and plumbers' supplies.

Mr. W. W. Loomis, G. V. S. Quackenbush & Co., dry goods.

Mr. John J. Hartigan, dry goods.

Mr. James J. Eddy, of Harvey & Eddy, wholesale grocers.

Mr. William B. Frear, William H. Frear & Co., dry goods.

Mr. William D. O'Brien, wholesale hardware dealer, if 20 feet to Troy but not to Albany only, together with others.

And without exception each and every one of the manufacturers and shippers are in favor of a 20-foot channel and predict that the commerce on the river will increase to such an extent that the Government will be justified in making the deeper channel.

The following preliminary statement issued November 14, 1911, by Census Director Durand shows an increase in every branch of Troy's commerce which should make a favorable impression on those in authority, who have under their control the bringing of the proposed greater waterway. I have added this, Col. Black, for the reason that it might escape your notice in the Government archives. It shows the different increases: Number of establishments, 17 per cent; capital invested, 20 per cent; value of products, 19 per cent; cost of materials used, 14 per cent; salaries and wages, 23 per cent; miscellaneous expenses, 17 per cent; value added by manufacture, 23 per cent; number of salaried officials and clerks, 26 per cent; average number of wage earners, 5 per cent.

I have added also information sought for at present is needed to convince the engineers in charge of an increase in commerce so that they may report in favor of a deeper channel. A deeper channel means better speed for our passenger service, more economical maintenance of all boats, and surely with an increased channel an enlarged commerce must result.

I submit two letters, one from Cluett, Peabody & Co., from the president, Mr. F. F. Peabody; another from Mr. James J. Caldwell, president of the Ludlow Valve Manufacturing Co.

Col. Black. Mr. Hutton, is not Cluett, Peabody & Co. on record as having stated that they do not use water transportation and would not?

Mr. Hutton. I will read you the letter, if you will allow me.

Col. Black. Well, do you remember the incident to which I refer?

Mr. Hutton. Yes; and in my talk with Mr. Peabody there was something about the dam or something of that kind.

Col. Black. I think they are on record in a public hearing in stating that they do not use water transportation and would not under any circumstances.

Mr. Hutton. Yes; but that was perhaps—they were not so much interested in the 12-foot channel, but when I talked 20-foot channel to him he opened his eyes. He says:

(Mr. Hutton read letter from F. F. Peabody, transmitted herewith.)

Col. Black. That was simply a question. I wondered about that matter. It was simply my recollection of the matter.

Mr. Hutton. Well, he is very serious in wanting this improvement. The Ludlow Valve letter is long and it relates to what they possibly could do with better facilities. I have also, if you care for it, a report made to the canal terminal body here in Albany, that is our new officials last year, which might be of interest, and to be returned when through.

Col. Black. Very glad to have it.

Mr. McKinney. Col. Black, just a moment, if I may come in here as president of the Albany Chamber of Commerce. I want to say so that our Troy friends may not feel that we in any way care to discriminate against them, that in all of our discussion in our committees and our trustee meetings and executive committee regarding this improvement we have had Troy in mind just as well as Albany, and all of our figuring as to the deepening of the channel has taken in Troy and put them in the same class with ourselves, because we feel that this improvement will extend to Troy and perhaps beyond that after the dam proposition—I am not swearing—is settled. I say that so that my Troy friends here may understand that we are not selfish in this respect, and when we refer to Albany it is simply we mean the Albany district which takes in Troy for the improvement just as well as the Hudson River at Albany.

Mr. JONES. Mr. C. F. Burns of Troy.

Mayor BURNS. Colonel, I want to say that when I came here I had no intention of making any remarks, as I understood that the matter which Mr. Barnes had talked about was gone over with our people at Troy and it was understood that the proposition would be general. I think our experience at Washington is sufficient for us to realize that it is pretty nearly time that the Hudson River, all New York State got together and did something, and the motives behind it would not be selfish or personal. The Middle West and South have been getting everything for the last 25 years, and it is about time that we got together as one body and demanded the rights which we are entitled to in the Hudson River. For five years I have been at Washington and I have never heard a reference to any improvement to the Hudson River in any way, shape, or manner. It has always been the Mississippi, the Missouri, and Ohio. Now, I think New York State is entitled to some consideration, and I think it is pretty nearly time that the Government at Washington considered that the Hudson River was entitled to consideration.

So that when I came here I came with the understanding that our interests were alike and that I am with Albany in anything that can bring about an improved condition for them as well as ourselves, because their condition improves ours and ours likewise. If we haven't the condition at Troy what good is it to Albany?

So there should be no personality in it, but I do take exception to the report made by Mr. Barnes in which he distinctly talks of Albany all the while. Now, I would request that he make it the Albany-Troy district, because in that way it would look as if the thing was not a personal matter. Off-handed he speaks of Troy occasionally or remarks about Troy, but that doesn't suit us. In his report it should be the Albany-Troy district. We are the head of navigation, and there is nobody under the sun can take it away from us. Even if the Government tried we will go back of the Government because we don't stop before the Government if they attempt to take what belongs to us. It is up there and we are going to have it.

Now, the channel will go to Troy or there won't be any channel. That is the way that we feel about it, and it is not a personal matter, but to the onlooker here it looks as though it is, and I would suggest that in that report he make the statement the Albany-Troy district, because we are entitled to some consideration, and I firmly protest against any selfishness on the part of Troy even with Albany. We are one, we want to be one, we have got to be one, to fight the Middle West and South. You know and Mr. Jones knows and when it came to the question at Washington where there was a question of taking Jones we are behind Jones to keep him where he was, and it was not a personal matter with us.

Col. BLACK. Mr. Burns, the difficulty I think under which every engineer who tackles this proposition labors is the increased cost of improvement the farther up the river you go. The bringing of 25 feet of water to Hudson would be a matter of almost nothing. Every mile you go above Hudson you get increased cost, due to the increased narrowness of the river and due to the increasing amount of rock that is found in excavation. The question with the engineers has always been, not at all the value of the commerce of the Hudson, because that is absolutely recognized, but how far up the Hudson true economy for the people of the State of New York and for the people of the United States would demand that this deep water be carried. And every mile that you go above Hudson you increase the cost by several million of dollars.

Mr. BURNS. Why should the Government stop at a few million dollars when we spend one hundred and eight or nine million dollars before we get through?

Col. BLACK. The Government ought to stop at nothing that is needed.

Mr. BURNS. No; they spent $200,000,000 on the Mississippi, and they want two hundred more. They don't mind five or six million.

Col. BLACK. I do not think you will find the engineers recommending in that line. That is for Congress, don't you see?

Mr. BURNS. The Adams Island of Troy we have for a few hundred thousand dollars, leaving something there that the Government knows and you know is a menace to navigation, which they had no right to do. They had some contractor take out the bottom of the river and pile it onto the island, pile it high, and I don't know whether he was favored or not but he did it just the same, and we have an eyesore there and a menace to navigation and you know it because you and I have talked about it and the Government ought to take it out of there and they shouldn't stop at $100,000 or they shouldn't stop at $10,000,000, because this river demands it, and they are paying more taxes than the Middle West and the South put together, and there is no reason why we should stop at $15,000,000 or $10,000,000. Suppose it is $10,000,000 or $50,000,000, we are entitled to it. We haven't asked anything of the Government; go over the Government records and see what they are getting and see what the Hudson River is getting, and then they speak here of $5,000,000 or $10,000,000 in the State of New York. It is a shame, too, the way we have been treated, and it is about time we had a say, and we are going to have our say and it isn't going to be a question of a few million dollars.

Now, we are at the head of navigation, we have got the largest industries in the country there, the largest tonnage is there, we have got a greater tonnage than most cities, we are fourth in the State, and we are entitled to consideration and we are going to be considered. Now, I don't think it ought to be a question of $1,000,000 or $2,000,000 or $3,000,000. It is a question of what belongs. We are the eastern terminal of the canal, and they can't take it away from us no matter what question you have or what is behind it. It is ours and we are going to have it, and they won't get it, and there is where they have got to have the condition to get traffic right up there at Troy, and it ought not to be a question, as I understand, of $5,000,000; to this Government what does it amount to? And what are we doing in return for the State of New York? We are going to have what we are entitled to, or there will be trouble, that is all there is to it. We always had to fight up there for what we have got, we always expect to fight, but we are going to make a fight that is fair and square, and we are going to make a fight for something that we are entitled to and we are going to get it, and that channel will go to Troy or there won't be any channel. That is the way we feel about it.

Mr. BARNES. I like the tone of determinedness of our man from Troy, and on personal privilege I want to speak a moment on what he has to say. I thought I made it plain all through my argument that the Albany district, or the capital district, as I refer to it several times, took in this whole district, goes as far west as Schenectady, goes as far north, if you please, as Mechanicville. All this is within a trucking radius, and I called it the Albany district for want of a name.

Col. BLACK. How far south do you go?

Mr. BARNES. Go as far south as Hudson, if you please. It is this district that wants this improvement. It is not an Albany project. Albany may be said to be in the middle of this district, but in making that project I carry it as far north as the Troy Dam. I want it distinctly understood in Troy that it is not an Albany proposition; it is not an Albany proposition at all, it is the capital district or the tidal Hudson district, taking it as far north as the United States Government or the Federal Government exercises its control over the waters, and we want, I say we, Albany, if you please, wants the cooperation of Troy, and we like the tone of the mayor's address as determining what we want. It is that kind of a spirit that must prevail in order to get this accomplished.

Mr. BURNS. Mr. Barnes, have you any objection to making that in the report the Albany-Troy district?

Mr. BARNES. I was just going to say, although I possibly had not made that as plain as I might in my report, I will submit a subscript to the report, saying that when I speak of Albany, I speak of this tidal Hudson as has been spoken of repeatedly in the report.

Mr. BURNS. That is off-handed, but not the report.

Mr. BARNES. No; I beg your pardon; it is in the report.

Mr. BURNS. Why not make it Albany-Troy district, then; that is plain enough.

Mr. BARNES. I say I will make that in my report; make that a supplement, saying when I speak of Albany here that it means the tidal Hudson clear up as far as the Troy Dam. That is as far as we can hope to get anything until this dam controversy is settled. But I want that distinctly understood that it is not a project for Albany; I could have said Troy all the way through just as I have said Albany. It is the capital district or this district, give it some other name if you want to. If I say Troy-Albany, then possibly Schenectady-Albany——

Mr. BURNS. No; they are not with us.

Mr. BARNES. They are within trucking distance.

Mr. BURNS. That is all right, but we are the head of navigation, and we want to be recognized.

Mr. BARNES. I want you recognized.

Mr. BURNS. I am out for anything you are out for. You know I am not selfish, but I want what we are entitled to. This is not a fight against them, but the way you hear that all morning about a seaport here and ignoring us, why it don't seem to us that it sounds very well.

Mr. **Barnes**. We will see that it is corrected.

Now, Colonel, I want to supplement Senator Hill on a few remarks he made, and in answer to a question or a criticism that you raised as to the——

Col. **Black**. I am only asking information, Mr. Barnes; I did not intend to criticize in any way.

Mr. **Barnes**. Yes, sir; as bearing upon the relative importance of this project as compared with some of the other projects, and in speaking on this question I do not want to be understood as criticizing any of the other projects, but, as a matter of comparison and reaching into the records, an answer to your question as to the relative importance, the paramountness of this question. The board of engineers who examined the Ohio River with the thought of improvement——

Col. **Black**. My question was not that. My question was the relative importance of carrying the depth up to Hudson and the depth up to Troy. That was the question that I must speak of, because the other question is a question which I have nothing to do with.

Mr. **Barnes**. As I understood you, you said in effect, Is this of as much importance as some of the other projects, or shall the United States spend this money somewhere else first?

Col. **Black**. Perhaps I did, but the part that I want particular enlightenment on is, Is it advantageous to the United States to expend the money for carrying this improvement a little farther, the 39 miles to Albany or the 45 miles to Troy, rather than to use this money elsewhere? You know that statistics will show that every single inprovement of a river on the South Atlantic coast of the United States has added directly to the commerce of New York State. That waterway of which you speak, the proposed intercoastal waterway, is one that will aid enormously toward adding to the commerce of the State of New York, giving a water outlet to the south as well as an inlet from the south.

Mr. **Barnes**. That is right, sir.

Col. **Black**. Now, these are undoubted facts. They come into New York. It is a question then how this money that is for the benefit of all the people shall be best expended. We have here in the Hudson River a most peculiar circumstance—an estuary with very deep water as far as Hudson. From there the Hudson River proper extends. There are no difficulties whatever of improvement below Hudson; the cost is nominal, almost nothing. The point that I was trying to get at with Mr. Heald was, Would it pay better for the people of the United States, in view of all that we have to do everywhere, to take the money that is to be expended which would be required to carry deep water up to Troy and develop some other means of getting the deep-water transportation from Hudson on up rather than spending that on the Hudson River itself?

Mr. **Barnes**. I do not quite get that point.

Col. **Black**. We have a broad river with deep water—no obstructions of any kind excepting fogs—to Hudson. When you get above Hudson you have a stream which necessarily must be narrow. You have also necessarily slight dangers and difficulties of navigation, and those, as I said, increase with each mile of going up the river. We will say it costs $10,000,000 to carry the deeper water to the city of Troy up to the present dam, whatever it may be. I am not familiar exactly with the estimates. Could the benefits to the people of this district that would come from the lowering of freight rates be secured better and more cheaply by spending that amount of money on the river itself, or could it be secured better and more cheaply by getting the short rail hauls to Hudson? Which would give the greatest development of commerce to this district? Take from Schenectady and the outlying regions, there is a certain amount of land haul necessary in any event. Now, could these benefits that undoubtedly would be attained by bringing deep water to this district be attained more readily and more cheaply by increasing the length of the land haul and making what would be undoubtedly an easier port to reach than coming above here, or could they be best attained by giving what would always be difficult navigation in the 39 miles from here to Hudson or the 40 some miles from Troy to Hudson? Deep-water sailors are not fond of going into a narrow river; it is pretty hard to get them there; very hard to get them there indeed; and that is shown everywhere by the difficulty of getting deep-water ships into the river. You take a great many classes of vessels, and they are towed in every case. It is recognized that every city which does not lie directly on the sea is under a very decided handicap, and it is pretty hard to induce deep-draft vessels to run up into these streams. Certainly it would be much harder to get them up here to Albany than it would to Hudson on account of the difficulties of navigation, no matter how good you get this upper river.

So the question comes entirely for the engineer in recommending the expenditure of the people's money, is really this the very best method of expending this money to get these benefits to this community? Taking the benefits for this community itself, granting the diminution of cost in the freight rates and the need for the increased facilities here, is this the best way of getting it, or is there a better? That is what we must consider, and that is the point that has not been much touched on.

Mr. Barnes. I thought that I had touched upon that sufficiently, but I will try to bring it out a little more clearly. In the first place, I propose a project 600 feet in width up to Van Wies Point, just below Albany; 400 feet in Albany to North Albany or to the lumber district in Albany; 300 feet in width from that point to the Troy dam.

Col. Black. I think that the present project is 400 feet to the Troy dam.

Mr. Barnes. So much better. But I had thought that that would be sufficient for the present at least to give that locality what was necessary for its present commerce. If you can get 400 feet, I say, Amen.

Col. Black. Could a sea ship turn around in that at all?

Mr. Barnes. A sea ship won't turn around in 300 feet, but it will turn around at the terminal, making a turning basin at the terminal around some of these islands at this point. I predict if this project is carried out that it is not a local enterprise, that the commerce within the next 20 years will be so great that you will find industries, terminals, and harbors and shipping facilities all the way from Troy to Hudson. If you stop at Hudson, you simply have stopped at a point beyond a railroad terminal. This is a railroad terminal and transshipping point. If they must carry their freight beyond the terminal, they must make up their train, and after once getting them into the train and getting started down the river they would naturally go on as far as possible, go clear to the next terminal.

Col. Black. Would it be cheaper to make the terminal at Hudson?

Mr. Barnes. I do not think that is the point.

Col. Black. I do not mean at Hudson; I mean at some convenient point on this portion of the river.

Mr. Barnes. The railroads already have this as their terminal. It is pretty doubtful if you can change their scheme, their method. The railroads from the east, from the New England States, the Boston & Maine and the Boston & Albany, come to this point now. If they must go down to Hudson as a terminal, they have got to change entirely their system, change their outlet. The same is true of the Delaware & Hudson. It comes in from the south at this point and from the north at this point, making this their terminal. So this is the natural transhipping and interchange of freight between the railroads. It is also at the junction of the two canals at this point. So this is the natural point for it.

Moreover, the powers that are to be developed in this locality are developed close to the Albany-Troy district—I want to speak of Troy. So that the industries will naturally start at this upper end of the Hudson, and as commerce increases, as the demands increase as we know they will with the growth of the country, those industries are going to spread farther and farther down on the stream until they come to Hudson or even beyond.

So that for that reason I believe that the upper end of the project is the most important, first, as the industries are established here, the railroads are established here, the canal systems are established here, the water powers are the nearest here, everything points to this point as the place for the starting not as to Hudson, where everything has got to be redeveloped and started all over again. That is the reason I believe that the upper end of the river is the place to start, and for that reason I believe it is the Government's duty to consider this end of it first, or to give us money so that this can be the opening wedge.

In this same connection in regard to the improvements that may be expected, there is a paragraph in the report of the barge canal terminal commission relative to the commerce of New York City, giving the terminal commission's recommendations, which I want to read into the record as something for you to consider. This is found on page 150 of volume No. 1 of the barge canal terminal commission of 1911:

"The railroads terminating in the port of New York maintain a differential rate on freight from Chicago to New York and vice versa in order to divert traffic to other ports. The effect of this is to unduly increase the cost of all commodities so transported and restrict the natural growth of the State's industries and commerce. The chambers of commerce, the boards of trade and transportation, the produce exchange, and the Merchants' Association of New York, wholly at their own expense, are now conducting a proceeding before the Interstate Commerce Commission for the purpose of securing the abolition of this differential rate. We [that is, the barge canal terminal commission] recommend that the legislature direct the attorney general to participate in this proceeding in behalf of the people of the State of New York."

That shows the condition of affairs that the shippers of New York City realize that they are up against now, and shows what the State of New York must do in order to find an overflow for the commerce that must reach that port. The commerce of that port now is probably half the water-going commerce of the United States, and you know well now without my calling your attention to it of the congested condition there now, congested conditions due very largely to the car-float service and the lighterage service across the harbor. New York is isolated from the continent at large. So that everything, it seems to me, points to this as the natural outlet rather than some point farther south.

If you care to, I will bring up, as a matter of comparison and not in any way criticizing—I will bring up some of the other projects to show the relative importance of this as against others.

Col. **Black**. That would be more for Congress, and an argument of that kind would probably bear more weight there. It is for the engineers, and that includes ourselves, the next the reviewing officer, which is the board of review, the next one above, the Chief of Engineers—we do not very much care for that; it is none of our business.

Mr. **Barnes**. Well, we have the statistics.

Col. **Black**. We have to merely justify in any recommendations that we make the expense to the United States on the ground that the saving will warrant it.

Mr. **Barnes**. Precisely; I understand.

Col. **Black**. And that is all we have to do; the rest Congress takes care of.

Mr. **Barnes**. I understand your position on that, but we have got statistics on that line, and when it is cared for we will present them.

Col. **Black**. That is what we want particularly.

Mr. **Jones**. Capt. Davis asked permission to submit a brief.

Col. **Black**. Yes.

Mr. **Jones**. There may be some gentlemen here that I am not familiar with; I am not sure whether there is anyone else here in favor of the enterprise or not.

Mr. **Barnes**. Mr. Kendig is still here, I believe.

Mr. **Kendig**. After listening to the discussion and recommendations of the engineers I appreciate that I have absolutely nothing to say from an engineering standpoint, and beyond the fact that I represent a small community of manufacturing interests, and that the manufacturing interests are always anxious and desirous of cheapening their product without reducing its quality, that some such relief from the pressing charges and congestion of the New York terminal will be very heartily welcomed by the manufacturing interests.

Col. **Black**. Are there any other gentlemen here who would like to be heard either in favor or contrary?

Mr. **Ropes**. Col. Black, I would like to bring out a thought which was suggested by the last statement which you made or question about the possibility of the terminal being at Hudson as over against the terminal being in this section. As I remember the geography of the Hudson River, and my point seems to be borne out by the established lines of communication, anything coming by ocean-borne vessels to Hudson, there to be transferred to rail, could not be directly sent from Hudson or any point in that vicinity directly west.

Col. **Black**. You would probably have to go north here.

Mr. **Ropes**. It would have to go north?

Col. **Black**. Yes.

Mr. **Ropes**. Now, as between the transferring from one carrier to another, I think it is well established that a commodity will go the longest distance in the cheapest carrier. As between rail and the ordinary tramp steamer, that is to-day operated under steam, the rail is more expensive than the ocean-borne tramp steamer carriage. Therefore, transfer at Hudson to rail, the rail continuing up the narrow ledge of ground available for rail service, to pass either Albany or near Albany for this western route would mean that the transfer would be made at a point where the distance from Hudson to Albany would be carried in the higher cost of rail transportation rather than by the cheaper operated boat transportation. Going west by rail, it must have the outlet already established at about this point.

I believe also that the increased rail facilities from Hudson up would be extremely expensive, because most of the way, as you know, the lines are cut at very high cost, in many cases into or through solid rock.

I believe also in view of the very recent developments in ocean transportation, the internal-combustion engine is now being used in units of 1,000 horsepower. England has built one ship and is already building a second large ocean-going vessel with an internal-combustion engine, making freight transportation by sea very much less expensive in proportion to cargo carried than even the present steam-propelled vessel is; and by the time we could get this thing through that same movement unquestionably would have extended in favor of the ocean borne, internal combustion engine propelled vessel. The advantage as between any transshipment from canal to ocean vessels I think would lie almost entirely in the question of dockage costs as over against New York. A transshipment, however, from the ocean-going vessel to the rail naturally, it seems to me, logically would come here at Albany or in this general district. I am speaking now of Albany in the broader sense.

It seems to me also, from what I have read recently in studies of the United States marine, that the great freight-carrying trade is done more by tramps, so called, than by regularly established lines; that it doesn't mean that we would necessarily have to have from Albany separate lines running to Charleston, or to Savannah, or to Rio de Janeiro, or to other specific points, but that vessels coming here from one point or group of points would be available for cargoes going to other points or groups of points, not on regularly established lines, and, therefore, that the question should not necessarily hinge upon the ability of this district to maintain regularly established sailings of vessels to certain definite points, but rather that the bulk of freight brought in from one group of points would make ships available for freight in equal bulk, if you please, or of equal value, to go to other points for distribution. So that, as I say, the question of regularly established lines I think is hardly a reason for the prosecution of this project.

Col. Black. No; the point that I tried to make out, Mr. Ropes, the point that I think is important, is that I believe there must be a sufficient amount of freight brought in to make it sure that at all times a carrier can be found. That is the only reason for the very great accumulation of freight at one point. We take it at a point like New York. You can always find a carrier to somewhere anywhere in the world, but when freight comes in in small lots in order that it shall go to the point of transshipment it must be known to the shipper that he certainly can get his transportation from there. In other words, you could not establish any point as a point for transshipment of small lots unless you are perfectly certain that they could get within reasonable time the means of shipment.

Mr. Ropes. Col. Black, I have had told me very recently—I haven't the full data—two facts that I think have at least a slight bearing on the case. One lumber concern has had three shipments of lumber in complete cargo lots from the Pacific coast, and they are to-day, I am told by the general manager of the lumber company—they have been previously specializing on pine, and this particular lumber which has been coming in, I believe, is cedar—they are now expecting to put a salesman on to the cedar proposition to sell nothing but cedar, which is the Pacific coast lumber of which they have had at present three ship loads come in. It means that they are going to develop a trade apparently in that particular commodity, which comes in complete cargo at the present time around the Horn, and will then come through the canal.

The other is that this city, I understand, is an accumulating point and a distributing point for large quantities of apples to foreign lands, and it is, I think, well established that there is a strong movement among the apple growers of New York State to wake up and get an apple crop that will be in fair competition with the western apple crop, that the neglected condition of the trees is being looked out for, and that the attention is being turned toward the development of the apple industry. This city, or this head of the Hudson, is geographically located for the Vermont and the New York State apple crop for foreign shipment, which would, of course, be but an occasional shipment. That is——

Col. Black. And you can add to that potatoes, also, and various other products.

Mr. Ropes. Yes.

Col. Black. It is not a joke; it is so.

Mr. Ropes. Oh, yes.

Col. Black. That is one of the biggest articles of commerce from this section.

Is there any other gentleman who wishes to be heard? If not, the meeting will adjourn. I am very much obliged to you, gentlemen, for the assistance you have given us.

Mr. Barnes. In the foregoing paper there have frequently been used the terms "Capital district" and "Albany." These terms have been adopted to avoid confusion, and wherever used are intended to include the Albany rate zone and the improvement of the tidal Hudson as far north as the Troy Dam. The terms might have been enlarged to include all cities in this locality, but it was thought by so doing the paper would have been confusing. Hence it is requested that this be known as the Albany-Troy project.

[Inclosure B.]

Correspondence of Lieut. R. D. Black, Corps of Engineers, Albany, N. Y., in connection with public hearing held December 18, 1911.

LETTER OF ALBANY CHAMBER OF COMMERCE.

ALBANY CHAMBER OF COMMERCE,
Albany, N. Y., November 20, 1911.

MY DEAR SIR: The executive committee of the Albany Chamber of Commerce at a meeting held to-day instructed me to ask you to arrange, if possible, for a public hearing regarding the proposed improving of the channel in the upper Hudson, the time and place of the same to be later decided upon. Trusting you will be able to grant this request, we remain,

Yours, very truly,
WILLIAM B. JONES, *Secretary.*

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF LIEUT. BLACK.

NOVEMBER 22, 1911.

MY DEAR MR. JONES: I desire to acknowledge receipt of your communication of the 20th instant, and to inform you that the question of setting a date for a publi. hearing will be taken up without delay with Col. Black, the district engineer officer

Very truly, yours,
R. D. BLACK,
First Lieut., Corps of Engineers.

Mr. WILLIAM B. JONES,
Secretary Albany Chamber of Commerce, Albany, N. Y.

LETTER OF SOUTH END BUSINESS MEN AND TAXPAYERS' ASSOCIATION.

SOUTH END BUSINESS MEN AND TAXPAYERS' ASSOCIATION,
Albany, N. Y., November 25, 1911.

DEAR SIR: It is earnestly requested by the Business Men's Association that you grant a public hearing in regard to the depth, etc., of the river channel.

Respectfully,
J. Y. READ.

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. J. Y. READ.

ALBANY, N. Y., *November 25, 1911.*

DEAR SIR: At a recent meeting of the City Plan Association the question of a deeper channel was discussed, and the committee in charge beg you to give them a public hearing.

Respectfully, yours,
J. Y. READ.

Lieut. R. D. BLACK,
Corps of Engineers.

NOTICE OF PUBLIC HEARING.

IMPROVEMENT OF HUDSON RIVER, N. Y.,
UNITED STATES ENGINEER OFFICE,
Albany, N. Y., December 11, 1911.

The district engineer office, New York district No. 1, having under consideration the question of securing increased depth in the Hudson River in connection with the preliminary examination and survey of "Hudson River, with a view to securing increased depth," ordered by the river and harbor act approved June 25, 1910, will give a public hearing at the common council chamber, city hall, Albany, N. Y., on Monday, December 18, 1911, at 10 o'clock a. m.

The district engineer officer, Col. William M. Black, desires that parties interested in the navigation and commercial uses of the Hudson River appear in order that full advantage may be taken of the opportunity to present all statements and arguments in connection with the proposition of securing increased depth.

While oral statements will be heard and given due consideration, important facts and arguments, which it may be desirable to forward for the consideration of higher authority, should be submitted in writing.

Attention is invited to the fact that the Hudson River is now being improved under a project which calls for a depth of 12 feet at all times of the year and a channel width of generally 400 feet. The question to come before the hearing relates solely to the advisability of securing a depth greater than that to be provided by this project.

You are invited to be present and be heard.

R. D. Black,
First Lieut., Corps of Engineers.

Parties to whom notice of hearing was sent and number sent.

[Sent Dec. 11, 1911.]

Winne Paper Bag Co., Ballston Spa	1
Ballston Cold Storage Co., Ballston Spa	1
Glens Falls Chamber of Commerce, Glens Falls	1
Glens Falls Lime & Cement Co., Glens Falls	1
Whitehall Silk Mills, Whitehall	1
Pulp Mills, Mechanicsville	1
Ballston Cold Storage Co., Schenectady	1
Troy Times, Troy	1
Troy Press, Troy	1
Troy Record, Troy	1
Troy Standard, Troy	1
Albany Evening Journal, Albany	1
Albany Times-Union, Albany	1
Knickerbocker Press, Albany	1
Argus, Albany	1
Mayor of Schenectady, Schenectady	5
Chamber of Commerce, Schenectady	5
New York Office	15
Texas Oil Co., Albany	1
Governor, State of New York	1
John R. Myers, Rouses Point	1
Postmaster, Poughkeepsie	1
Mayor, Poughkeepsie	5
Postmaster, Newburgh	1
Mayor, Newburgh	5
Postmaster, Kingston	1
Mayor, Kingston	5
Postmaster, Saugerties	1
Mayor, Saugerties	5
Secretary Chamber of Commerce, Cohoes	5
Secretary Chamber of Commerce, Watervliet	5
Secretary Chamber of Commerce, Rensselaer	5
Mayor, Albany	3
Mayor-elect Lunn, Schenectady	3
Mayor of Troy, Troy	3
Mayor of Rochester	5
New York Central & Hudson River R. R., Albany	5
New York Central & Hudson River R. R., New York	5
Delaware & Hudson Co., Albany	5
Boston & Maine Railroad Co., Troy	5
Hudson Navigation Co., New York	3
Hudson Navigation Co., Albany	3
Murray Line, Troy	2
Cornell Steamboat Co., Rondout	3

Capt. Ulster Davis, Rensselaer	2
Standard Oil Co., New York	2
Standard Oil Co., Albany	2
Mr. Coffin, harbor master, Hudson	5
C. E. Holden, Whitehall	5
Mr. Read, City Plan Association, Albany	10
Postmaster, Albany	1
Albany Chamber of Commerce, Albany	15
H. D. Hadley, Plattsburg	10
S. H. Howard, Burlington	6
Witherbee, Sherman & Co., Port Henry	2
Chamber of Commerce, Buffalo	5

LETTER OF MESSRS. WITHERBEE, SHERMAN & CO. (INC.).

WITHERBEE, SHERMAN & CO. (INC.),
New York, December 14, 1911.

DEAR SIR: I regret extremely that I will not be able to be present at the conference to be held in Albany on Monday, December 18, at 10 a. m., for the purpose of considering the project of deepening the channel of the Hudson River to Albany and thus making that port practically a seaport.

If the project is acted upon by the Government, I feel confident that it will be of inestimable advantage to the entire northern and western part of the State. It will bring about an increased development of our forests and mines and stimulate very greatly our agricultural exports. Speaking more particularly of the Champlain Valley, in which I have large business interests, I would say that probably in the next five years at least 300,000 tons of our iron ore will be shipped to Philadelphia, Baltimore, and possibly to eastern ports where projects for the erection of steel plants are now being contemplated. This tonnage, if Albany were made a seaport, would be transferred at that point into vessels sufficiently large to reach seaboard points. I might say also in passing that during the last 15 years we have twice exported a considerable tonnage of ore to Europe and this trade is likely to be revived in the future.

Another large industry in the Champlain Valley promises to be the apple crop, which is increasing by leaps and bounds, and this product in the near future is very likely to be exported to Europe.

Very truly, yours,

F. S. WITHERBEE, *President.*

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF CORNELL STEAMBOAT CO.

CORNELL STEAMBOAT CO.,
New York, December 20, 1911.

DEAR SIR: A little time ago a representative of yours, Mr. Benjamin, asked for certain figures to show the advisability of greater depth of channel in the Hudson River. The character of our business varies, and it is impossible to make up some of the statistics he asked for, but in general we are unable to see the necessity for a 20-foot channel in the Hudson River. All of the present business could be handled if the 12-foot channel were maintained, and we do not see how any greater depth of water would increase the volume of business.

Yours truly,

CORNELL STEAMBOAT COMPANY.
FRED COYKENDALL, *General Manager.*

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MESSRS. CHAS. M. BETTS & CO.

CHAS. M. BETTS & CO.,
Buffalo, N. Y., December 20, 1911.

DEAR SIR: Replying to circular communications, dated the 11th and 18th, from you and Mr. M. G. Barnes (name may be in error as signature is not plain).

The time is near at hand when we must look to the Pacific Coast States for the major part of our lumber supply, and if the Panama Canal is to be of any benefit to the dealers and the consumers of lumber in Western New York, provision should be made to enable Pacific coast vessels to deliver their cargoes at Albany, N. Y.

If we had to unload these vessels in New York City, it would mean a transfer at that point and again at Albany, and the terminal charges and annoyance would more than offset the difference in all-rail haul from the Pacific coast mills.

We favor the plan of deepening the Hudson River sufficiently to enable the Pacific coast boats to deliver their lumber cargoes at Albany, N. Y.

Very truly,

CHAS. M. BETTS & CO.

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF HUDSON NAVIGATION CO.

HUDSON NAVIGATION CO.,
Troy, N. Y., December 22, 1911.

DEAR SIR: At the hearing held in the common council chamber in the city of Albany, December 18, 1911, before Col. W. M. Black, in relation to the consideration of securing increased depth of water in the Hudson River, Col. Black very kindly consented to having my views on the matter submitted in writing.

No arguments that I heard presented at that meeting change my views expressed in my letter to you on the same subject, dated June 29, 1911, a copy of which I inclose herewith. I also inclose copies of letters of Capt. Keller of the steamer *C. W. Morse*, dated July 1, 1911; Capt. Wilson of the steamer *Adirondack*, dated July 3, 1911; Capt. Brown of the steamer *Trojan*, dated July 2, 1911; and Capt. Bruder of the steamer *Rensselaer*, dated July 3, 1911, having bearing on the same subject.

As the captains above referred to navigate the largest and most costly boats operating on the Hudson River, carrying hundreds of thousands of passengers and millions of dollars worth of property each season, their views should have more weight than theorists. I am still of the opinion that it is not only unwise but unnecessary to ask the United States Government to spend many additional millions of dollars to make a channel 20 feet deep instead of the 12-foot channel now provided for, until the business of the river will make the increase of draft necessary.

Yours truly,

ED. F. MURRAY, *Vice President.*

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. GEO. H. BROWN.

NEW YORK CITY, *July 2, 1911.*

DEAR SIR: I have been requested to write you, giving my views in relation to depth of channel to be dredged in the upper Hudson River.

I will say, to the best of my judgment, that the present suggestion of a channel 400 feet wide, with a depth of 12 feet at the lowest stage of the tide, is all that is required at present, as there are no boats running on the upper Hudson River that draw more than 11 feet, and the 12-foot depth would enable them to navigate safely, which they are unable to do at the present time.

I would suggest, however, that where you have to leave a bank on either side of the channel, which will no doubt be necessary in places to get the required depth of 12 feet, that you slope the bank 75 or 100 feet, so that it will not be washed back into the channel by freshets, tides, or steamboats in passing.

Respectfully,

GEO. H. BROWN,
Captain Steamer "Trojan."

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. GEO. H. KELLER.

ALBANY, N. Y., *July 1, 1911.*

DEAR SIR: I am in receipt of a letter from Mr. E. N. McKinney, president of the Chamber of Commerce, Albany, N. Y., asking my opinion as to how much water the Hudson River should be dredged.

We now have 12 feet of water in mean low water, and in the fall of the year when we have the northwest winds the water will fall far below 12 feet.

If you will dig the river out to 12 feet for the lowest tide and 400 feet wide, I do not think you will ever receive a complaint, and furthermore, think it would be waste of money to make more water than 12 feet at the lowest tide.

Respectfully,

GEO. H. KELLER,
Captain S. S. "Morse."

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. E. S. WILSON.

NEW YORK, *July 3, 1911.*

DEAR SIR: The president of the Chamber of Commerce of Albany, N. Y., has requested my opinion as to the depth of water necessary in the upper Hudson.

In my judgment all that is necessary would be to have the channel a depth of 12 feet at mean low water and a width of not less than 600 feet. This width is necessary, I believe, to give ample room for my steamer to swing should we be obliged to anchor in a fog.

As I understand it, Congress has passed an act to dredge the channel to a depth of 12 feet, and it is important that this work should be done at once, as it will only delay the improvements should a greater depth be asked for.

Yours, very truly,

EDMUND S. WILSON,
Captain Steamer Adirondack.

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. C. H. BRUDER.

NEW YORK, *July 3, 1911.*

DEAR SIR: I have been asked by the Albany Chamber of Commerce to give you my views in regard to improving the channel of the upper Hudson.

In my judgment we require at least 500 feet in width and a depth of not less than 12 feet at extreme low water to navigate with safety, as some of the boats on the Hudson River are over 400 feet long. Would also add that where there is a bank left on either side it should be sloped off enough to prevent it from washing back in the channel by freshets and swells from large steamers.

The channel between Van Wies Point and Staats and above the upper Albany railroad bridge needs immediate attention. It is almost impossible to pass a tow at Van Wies Point in the present condition of the channels.

Yours, very truly,

C. H. BRUDER,
Master Steamer Rensselaer.

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF HUDSON NAVIGATION CO.

HUDSON NAVIGATION CO.,
Troy, N. Y., June 28, 1911.

DEAR SIR: I am requested by Mr. W. W. Loomis, president of the chamber of commerce of this city, to give you my views in relation to the suggestion of increasing the depth of water in the channel of the Hudson River from the present adopted depth of 12 feet at the lowest stage of tide to 20 feet.

I believe that a channel 400 feet wide and 12 feet deep at dead low water is all that is necessary at present, but if in the years to come the development and increase of business should make a deeper channel necessary it would cost but little, if any, more to do the additional work then than it would cost if it was done now in connection with the present improvements.

The steamers *Morse* and *Adirondack* of the People's Line between Albany and New York are the largest boats navigating the upper Hudson and they draw not over 10½ feet when fully loaded. The steamers *Trojan* and *Rensselaer* of the Citizen's Line between Troy and New York draw 9 feet 2 inches when loaded, and the Murray's Line barges draw about 9 feet when loaded. From this you can see that if we have 12 feet of water at the lowest stage of the tide that there will be plenty of water to navigate the upper Hudson at the lowest stage of the tide at all times.

The General Government has been very fair with the Hudson River improvement since the matter was brought to its attention some 17 or 18 years ago, and it seems to me to be unwise to ask it to spend a large and to my mind an unnecessary sum of additional money now to make a channel 20 feet deep when a 12-foot channel will meet every reasonable requirement. Of course, as a transportation man, I do not object to have the 20-foot channel, but it seems to me unjust to ask the Government to spend the money to make a 20-foot channel when a 12-foot channel meets all the present requirements and may meet all the requirements for many years to come.

Yours, truly,

ED. F. MURRAY, *Vice President.*

Lieut. R. D. BLACK,
Corps of Engineers.

LETTER OF MR. E. P. NORTH.

NEW YORK, N. Y., *December 8, 1910.*

* * * * * * *

I am also inclosing a cutting from the Sun of August 24 last.

My conviction that the sites of manufacturing industry are controlled by the comparative costs of assembling the raw material and distributing the finished products is so strong that I am inclined to fear that I have —well grounded in theory—retired within myself and evolved a state of facts; but I have seen no one who would, after a moment's consideration, try to controvert the statement.

Albany and Troy, as you know, are more favorably situated, except for coal and costs of freightage, for the manufacture of iron than most any other locality. There are the magnetic ores west of West Point, the limonite ores in the line between this State and Connecticut, the spathic ores of Columbia and Dutchess Counties, the ruined kilns for treating which still stand as a monument to Gillespie. The ores of Lake Champlain and the titanic ores of Lake Sanford, with the comparative cheap introduction of foreign ores, permit an admixture not so economically attainable in other localities, and the capital requisite for maintaining and extending that industry and others dependent on cheap and convenient iron was in hand.

The Gillespie report destroyed commercial confidence in all these industries. Whether the capital for their rehabilitation could be reassembled by a 20 or 22 foot channel may be doubted, but no one, I take it, can think it will be reassembled with a 12-foot channel. Other industries, like the collar and cuff industries, may come to Troy and Albany despite a 12-foot channel, but they will not be industries requiring heavy freight bills. This is already pretty long. If you had typhoid, what would you do to a doctor who proposed to add 10 per cent to your care (cure) for the next 10 years and then talk of doing something better?

Yours, truly, if somewhat brusquely,

EDWARD P. NORTH.

Lieut. R. D. BLACK,
Corps of Engineers.

STATISTICS OF MR. E. P. NORTH.

Troy and Albany—A study of the causes that have made their population stationary.

NEW YORK, *August 21, 1910.*

To the EDITOR OF THE SUN:

SIR: If you will allow me to interpolate in the population of Albany, as given in your editorial of August 19, "Five cities," that for 1890, and add certain other statistics as well, we shall have—

Population of Albany:	
1880	90,700
1890	94,900
1900	94,100
1910	100,200
Population of Troy:	
1880	56,700
1890	61,000
1900	60,700
1910	76,813

And taking the four counties immediately below the State dam—viz, Albany, Rensselaer, Columbia, and Greene—we have:

1870		1880		1890		1900	
Population.	Value of manufactured products.	Population.	Value of manufactured products.	Population.	Value of manufactured products.	Population.	Value of manufactured products.
311,500	$63,081,000	350,800	$80,017,000	366,800	$92,881,000	362,000	$91,746,000

These figures show, as far as statistics are reliable, that the region between the head of 30-foot navigation, above Athens and Hudson, and the State dam, above Troy, reached apex both in population and in productive capacity about 1890. And as you say, "Nor is it entirely simple to explain the fact, now that it has happened." But a partial if not an entirely satisfactory explanation of the cause which turned Albany from a center of manufacturing to a center of political activity may be found in the House Executive Document No. 23, first session, Fifty-second Congress, which is a report, dated October 1, 1891, by three Army engineers, Messrs. Gillespie, Stickney, and Raymond, condemning a project for deepening the river "for the navigation of seagoing vessels drawing 20 feet of water." About the same time this report was written Albany and Troy were the centers of the stove-making industry of this country. Albany, besides having a large blast furnace, was struggling for a prominent place in machine tool building. The ironworks on Breaker Island were noted for their up-to-date character, and the Bessemer plant at the Burden works was still in operation. All these industries are now a memory, if they are not wholly forgotten.

It is not absolutely correct to say that the location of the industries is governed by the relative cost of assembling raw materials and distributing the finished products. The collar and cuff industries of Troy, with thanks to the late Senator Murphy's intervention in the framing of the Wilson-Gorman tariff, has not suffered from high freight rates; nor has the fact that freight rates in New England are about twice as high as in the rest of the country eliminated industry from that section of the country, but those freight rates have driven all heavy manufacturing to other localities. The industries of Troy and Albany required a large expenditure for freight per unit of value, and condemning them to no future decrease in freight costs sent them to other localities, to the great loss in population and income of this State.

EDWARD P. NORTH.

Papers submitted by Mr. M. G. Barnes, consulting engineer, State barge canal, in connection with public hearing held December 18, 1911.

LETTER OF MR. MORTIMER G. BARNES.

ALBANY, N. Y., *December 19, 1911.*

DEAR SIR: At the public hearing yesterday relative to the proposed deepening of the tidal Hudson a few points were brought out in the discussion that were not answered clearly in the paper submitted at that time. Hence I desire to answer those questions more thoroughly.

First. It was suggested that even if the tidal Hudson was made navigable to over-sea vessels captains would object to the use of restricted channels for such vessels. While this has been true in the past, it is believed that the growing needs of commerce are educating masters to the handling of their boats in restricted channels. There is submitted herewith a letter from Joseph Ripley, member of the board of consulting engineers, and formerly general superintendent of the Sault Ste. Marie Canal, relative to this subject. Mr. Ripley has seen long service on that canal and is probably the best engineering authority that can be quoted on that subject. I also desire to invite your attention to the conditions in European harbors, many of which are at a great distance from the open sea. For example, Hamburg lies on the Elbe River 85 miles from the sea. Bremen is 75 miles up the Weser, and Antwerp 59 miles up the Scheldt. The Elbe has been improved from a 6-foot draft to a draft of 8 meters and a width of 200 meters, so that now it accommodates vessels of the size of the *Kaiserin Auguste Victoria*, a vessel of 25,000 gross tons. The channel is just now being improved to accommodate the new Hamburg-American liner *Imperator*, a vessel of 50,000 gross tons.

In order to use the Panama Canal, captains must be trained in using that more or less restricted channel some 50 miles in length. The intercoastal canals are being designed to accommodate over-sea and coastwise vessels. Their channels are in many places restricted to canal dimensions, making them much more difficult to navigate than are open river channels such as the tidal Hudson. Moreover, if the commerce is at all commensurate with the cost of construction those canals will be very generally used.

From these examples it appears that the trend of the time is to call for a certain amount of navigation in restricted channels.

Second. Another point brought out at the discussion was the question of full cargo shipments that might be expected from this district. Among other articles I might name the following as probable commodities commanding full cargo shipments: Lumber, cotton and cotton products, flaxseed and flaxseed products, paint, coal oil, iron and steel, tropical fruits, apples, potatoes and other farm products of northern New York, flour, grain, meat, sugar, agricultural machinery, chemicals, sand, and cement. To this list may be added the various lines of manufactured goods that may be handled in passenger packet steamers. It is thought that much trade in this line would be developed soon in Atlantic coastwise traffic.

Third. I have been asked what bearing the State's good roads project has on transportation facilities by canal or otherwise. The macadamized or paved roads of the State reduce hauling to and from canals to a very low figure. I submit herewith photograph of a battery truck designed by the General Electric Co., which truck is in use at the Bush Terminal in New York City and at Canajoharie on the State canals. These trucks show in actual service that they can handle freight even at such short hauls as half a mile at about 3 cents per ton-mile which includes all costs of operation and maintenance and interest on investment. This cost would be very materially decreased in long hauls on good roads. Various automobile manufacturers are solving the question in different ways. So it appears that the zone of usefulness of the canals is going to be very greatly enlarged inasmuch as these trucks will handle the commerce to a radius of, say, 75 miles and deliver goods more cheaply than can be done by rail, taking into consideration the cost of loading and unloading at the ends of the haul and the trucking charge.

Fourth. It has been stated that there might be other points along the Hudson River between Albany and New York that are available as distributing points for coastwise and over-sea commerce, Newburgh being specifically mentioned as such a seaport.

By reference to map of New York State, it will be seen that there is no city between Albany and New York that has railroad connections directly with the New England States and with the Western States. Newburgh is an apparent exception to this in that it has connections with Chicago and the West. The New York, Ontario & Western and a branch of the Erie Railroads reach the Hudson at Cornwall and Newburgh. Only one of these railroads (the Erie) is a trunk road to Chicago. This is a very weak road, with bad alignment and heavy grades. The Erie has already good terminal facilities on the west bank of the Hudson opposite New York City, and it is not at all likely that this road will look with favor upon the construction of new terminal facilities some 50 miles upstream, inasmuch as such second terminal will only cut off 36 miles of their distance between New York and Chicago.

Below is a table of distances between Hudson River points and Chicago, showing the advantage of the Albany district as a distributing point for commerce to and from Chicago and the West:

	Miles.
New York to Chicago:	
Pennsylvania system (Fort Wayne route)	908
New York Central & Hudson River R. R. lines (L. S. & M. S. route)	980
Erie	999
Baltimore & Ohio (from Jersey City)	1,045
Newburgh to Chicago:	
Erie	963
Albany to Chicago:	
New York Central & Hudson River R. R. lines	837
Delaware & Hudson (Erie lines)	927
New York to Buffalo:	
Delaware, Lackawanna & Western	411
Erie	425
New York Central & Hudson River R. R	439
Lehigh Valley	462
Newburgh to Buffalo:	
Erie	389
Albany to Buffalo:	
New York Central & Hudson River R. R	296
Delaware & Hudson (Erie)	353

Very respectfully submitted.

M. G. Barnes.

Lieut. R. D. Black,
Corps of Engineers.

LETTER OF MR. JOSEPH RIPLEY.

Albany, *December 19, 1911.*

Dear Sir: At the public hearing yesterday morning before Col. Black, anent the deepening of the Hudson River, he stated very correctly that cities not located directly on ocean harbors are seriously handicapped in becoming seaports by reason of dislike of captains of ocean craft to navigate narrow or winding channels.

His words carried the impression that this one circumstance taken in connection with the 150 miles of navigation in the Hudson River would preclude the possibility of Albany or any of its near-by cities ever becoming ocean ports.

The Hudson River can be improved at reasonable cost so as to be safely and easily navigated at fair rate of speed, day or night, by ocean steamers with draft of approximately 25 feet.

On the Great Lakes the captains have thoroughly mastered the difficulties of navigating narrow and tortuous channels.

The channel in St. Marys River, Mich., has been improved through shoals of sand, clay, bowlders, and rock for a length of 35 miles. Since 1908 the width has been 300 feet for channels used by ships moving in one direction, and 600 feet and upwards where common for both ways. The boats load to within a few inches of improved depth of channel, generally less than 6, and make about 9 miles an hour in the improved reaches. Over 200 of the steamers are 500 to 617 feet long and carry 10,000 to 14,000 tons of cargo on a draft of 18 feet.

From Hay Lake to Mud Lake the dredged channel 300 feet in width was continuous for 14 miles, and during the eight months of navigation in 1907 more than 58,000,000 tons of freight passed through that reach of the river on boats passing through it both ways both day and night.

Very truly yours,

Joseph Ripley,
Consulting Engineer for State Canals.

Mr. M. G. Barnes,
Albany, N. Y.

LETTER OF UTICA CHAMBER OF COMMERCE.

UTICA CHAMBER OF COMMERCE,
Utica, N. Y., December 14, 1911.

DEAR SIR: I have attempted to secure data in connection with the tonnage between Utica and seaboard towns, as you requested. The results have been very unsatisfactory by reason of the little exporting done from this city and from the fact that a large proportion of our product is in the textile field. I called personally on some half dozen of our local manufacturers and they assured me that a very small part of their total output would be available for water transportation. There is one item of freight, however, that comes entirely within the scope of your investigation—raw cotton. The cost, estimated at the hands of experts, shows that Utica receives yearly $7,000,000 worth of raw cotton, or 125,000 bales, 500 pounds to the bale. Practically all of this could be shipped to Utica from the cotton ports of the South by water. The estimated amount of Pacific-coast lumber shipped to this neighborhood annually is 200 carloads, averaging 80,000 pounds to the car.

I have yet to hear from some dozen of our largest manufacturers, and if their information contains anything that may be of use in your campaign I will forward it to you immediately.

Very truly, yours,

D. F. HOWE, *Secretary.*

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF MESSRS. W. M. CROMBIE & CO.

W. M. CROMBIE & CO.,
New York, December 15, 1911.

DEAR SIR: We are interested in your favor of the 14th instant, and in reply will say that we are distributers of Canadian lumber in large quantities, and our deliveries are usually made by canal boats or by Williams Barge Line from Albany. We do not bring in any lumber to Albany by seagoing vessels.

It is quite possible that some time, if there is sufficient depth of water at Albany, that shipments of Canadian lumber for South America might be made from Albany by sailing vessel, though in these latter days there is more lumber being shipped out by steamer, on account of the difficulty of chartering sailing vessels. Each year steam seems to be supplanting sailing vessels, and on that account there would seem to be less likelihood of shipping out by sailing vessels year by year.

We would be pleased to be present at the meeting that is to be held at Albany in the near future, but will be unable to do so.

Yours, truly,

W. M. CROMBIE & CO.

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF THE HELDERBERG CEMENT CO.

THE HELDERBERG CEMENT CO.,
Albany, N. Y., December 15, 1911.

DEAR SIR: We desire to indorse very strongly the movement for deepening the channel of the Hudson River to Albany, so that seagoing vessels may readily reach our docks and provide from Albany a direct connection to coast ports both on the Atlantic and Pacific seaboards as well as to foreign ports. Portland cement is such a heavy product and its value per pound is so small that the economic field for rail shipments from any one plant is quite limited.

The opening of the new barge canal will somewhat increase our economic field for shipments, but there again the rates made are such as in themselves will give a primary profit to the carrier. It is the experience in foreign countries, however, where export trade in Portland cement has assumed large proportions that the ocean carriers are glad to get this heavy and easily packed commodity for ballast and expect to derive from its transportation only a secondary profit. Thus the transportation rates for ocean shipments are very low and correspondingly enlarge the field which the manufacturer may cover.

The situation in Albany should be unusually favorable in this respect, since it is to be anticipated that many lumber carriers will make Albany their destination and on their return will usually reach a field where cement can be sold at a good profit when carried at the transportation rates to be expected.

As all the captial invested in our plant is owned by Albanians and all our business is done through this place, we are particularly interested and concerned in this matter, which, as we believe, opens up fields otherwise impossible for us to touch and which should result in many thousand tons per annum additional business, the benefits of which should be of advantage to the entire community.

We hope you will strongly urge this view upon the proper authorities.

Yours, truly,

THE HELDERBERG CEMENT CO.,
By FREDK. W. KELLEY, *General Manager*.

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF MR. C. F. LOOMIS.

PHOENIX, N. Y., *December 16, 1911.*

MY DEAR SIR: At the suggestion of Mr. Sweet, I am writing you in regard to what would be necessary in order to handle yellow-pine timber at this point and carrying a stock for distribution to points in this section of the State.

This stock is so heavy and the distance from the source of supply so great that the rail rate is almost prohibitive to permit its general use. If the waterways from tide water (New York) were of sufficient capacity to permit ocean vessels to load at the mills in the South and come up through the Hudson River, and thence by New York State barge canal to us without rehandling, we are confident a large business in this material would be maintained.

Very sincerely, yours,

C. F. LOOMIS.

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF THE TOWNSEND FURNACE & MACHINE SHOP CO.

THE TOWNSEND FURNACE & MACHINE SHOP CO.,
Albany, N. Y., December 17, 1911.

DEAR SIR: I estimate the amount of weight of shipments sent elsewhere outside of New York City by this concern at 500 tons to 600 tons of castings, etc.

Very truly, yours,

THE TOWNSEND FURNACE MACHINE SHOP CO.
JOHN T. BRADY, *Treasurer*.

Mr. J. Y. REID, *City*.

P. S.—Been out of town all day, but hope this will reach you in time for your purpose.

LETTER OF UTICA CHAMBER OF COMMERCE.

UTICA CHAMBER OF COMMERCE,
Utica, N. Y., December 16, 1911.

DEAR SIR: I have been advised in this morning's mail that the Utica Steam Cotton & Mohawk Valley Cotton Co. of this city, manufacturers of cotton goods, ship to New York, Atlantic, Pacific, and foreign points, annually, some 25,000,000 pounds, and this includes largely export shipping.

Very truly, yours,

D. F. HOWE, *Secretary*.

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF MR. J. T. NEWMAN.

NEW YORK, *December 16, 1911.*

DEAR MR. BARNES: Pursuant to notice and your request communicated through Hon. Charles E. Treman, superintendent of public works, I was designated to attend the hearing before Col. Black, to be held at the council chamber in Albany, on Monday next at 10 a. m., to consider the advisability of deepening the Hudson River to some depth greater than 12 feet. It looks now as if I would be unable to be present. In my probable absence, I send this letter, which you are at liberty to read from if you see fit.

The shippers and residents about Cayuga and Seneca Lakes, which are now virtually a part of the barge canal, by reason of the connection therewith now under construction, are deeply interested in the project for deepening the Hudson River. The principal salt deposits of the State center about Ithaca and Watkins, located on these lakes. An increasing quantity of salt and cement, besides gypsum, grain, and other commodities, are being shipped from this locality.

Furthermore, the proximity of the coal mines to Ithaca and Watkins are, in our judgment, sure to make these points the natural route for the shipment of coal, so that with the opening of transportation from these lakes over the barge canal we can reasonably count upon a traffic of immense volume. It is of great importance, not only to us but to all who will use the enlarged canal, that the facilities for transportation on the Hudson River be improved.

Yours, very respectfully,

Jared T. Newman.

Mr. M. G. **Barnes**, *Albany, N. Y.*

LETTER OF THE SENECA FALLS MANUFACTURING CO.

The Seneca Falls Manufacturing Co.,
Seneca Falls, N. Y., December 19, 1911.

Dear Sir: In compliance with your recent request, we have interviewed the New York Central and Lehigh Valley officials in regard to the amount of freight shipped from this station, destination to and through New York City, and find that they forward annually about 25,000 tons for this point, approximately 7,500 tons being manufactured articles, the balance natural products. A large and indeterminable portion of the manufactured goods are for over-sea shipment, the balance for the southern and coastwise trade.

A very large percentage of the goods destined for foreign shipment go to the port of New York, but in some instances export customers are specifying shipment to Boston or Canadian ports, preferring to pay the slight advance in railroad rates to such destination rather than to suffer the delays and excessive port charges at New York.

This information, while not so perfect as we would like, is the best available at present and we trust may be useful to you.

Yours, very truly,

The Seneca Falls Manufacturing Co.
Paul B. Kendig.

Mr. M. G. **Barnes**, *Albany, N. Y.*

LETTER OF MESSRS. W. C. EDWARDS & CO. (LTD.).

Ottawa, Ontario, *December 15, 1911.*

Dear Sir: We are greatly obliged for yours of yesterday's date inclosing copy of notice of hearing to be held in your city on Monday next, at which an opportunity will be given to those who desire to express their views as to the advisability of deepening the Hudson River from Albany to New York City so as to facilitate ocean-going vessels coming up to Albany. As to this we may say that we can have no suggestions to offer, as our shipment is entirely outward and not inward, and no matter what depth of channel may be obtained in the Hudson our shipments will be limited by the possibilities of the Richelieu River and the Champlain Canal.

Yours, truly,

W. C. Edwards & Co. (Ltd.).
Wm. C. Edwards.

Mr. M. G. **Barnes**, *Albany, N. Y.*

LETTER OF MINETTO-MERIDEN CO.

MINETTO-MERIDEN CO.,
Minetto, N. Y., December 20, 1911.

DEAR SIR: In reply to your inquiry as to the tonnage which this company could handle to advantage via Albany, provided there was deep water navigation to that point.

An analysis of our records shows that provided the saving in freight was sufficient to offset the delay, we could handle from 7,500 to 9,000 tons to advantage per annum.

We regret our inability to forward you these figures more promptly, but it required considerable detail work to secure the correct amounts.

Yours, truly,

MINETTO-MERIDEN CO.
T. D. MCCHESNEY, A. M.

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF SURRY LUMBER CO.

SURRY LUMBER CO.,
Baltimore, December 20, 1911.

DEAR SIR: In response to your circular letter of the 14th instant, in respect to a movement to secure an increased depth of water to Albany, we would say that we perhaps distribute in the upper part of New York State some 20,000,000 to 25,000,000 feet of lumber per annum, which we ship from our mills located in the vicinity of Norfolk, Va., which lumber is now distributed by rail, but if there was as much as 18 to 20 feet of water to Albany we could possibly move a large percentage of this lumber over sea and distribute from Albany to better advantage to the buyers thereof than the facilities which we now have permit us to do.

Yours, respectfully,

SURRY LUMBER CO.
F. C. WATERS, *President.*

Mr. M. G. BARNES, *Albany, N. Y.*

LETTER OF EDWARD HINES LUMBER CO.

CHICAGO, ILL., *December 20, 1911.*

DEAR SIR: Replying to your letter of the 14th instant, would say we are interested directly and indirectly in about 5,000,000,000 feet of yellow pine in Mississippi, and when this is manufactured into lumber a great deal of it will go to New York City and probably Albany for redistribution.

We believe that if a channel is made at all it should be made 22 to 30 feet deep, so that seagoing vessels could go all the way to Albany and not break freight in bulk anywhere between New York and Albany, but should be able to go direct to Albany and there discharge their cargoes on the docks. We believe that if the river was so improved that a great deal of the timber would be manufactured into lumber and that a certain percentage would go via Albany.

If there is any further information we can furnish you, we shall be glad to do so.

Yours, truly,

EDWARD HINES LUMBER CO.

Mr. M. G. BARNES, *Albany, N. Y.*

Papers submitted by Albany Chamber of Commerce in connection with public hearing held December 18, 1911.

ARGUMENTS OF THE ALBANY CHAMBER OF COMMERCE.

For the past 10 years the Albany Chamber of Commerce has from time to time advocated the subject of a greatly improved channel in the upper Hudson, believing that the present channel is entirely inadequate to properly accommodate the present commerce on the river; that the improvement now under way for the securing of a channel 12 feet deep at extreme low water will barely accommodate the present traffic on the river and will not be of sufficient depth to properly care for the increased commerce which will come to the river during the next few years; and that a greatly increased depth must be secured in the near future to meet the increased commerce which will come to the river upon the completion of the barge canal and also to allow for the commercial advancement which is bound to come to that part of New York State located on the upper Hudson. We have in connection with former arguments endeavored to show—

First. The difficulties in operating the present steamers now using the upper Hudson, and the disadvantages, additional expense, and frequent danger caused by an insufficient depth of water under their bottoms.

Second. That the present commerce on the river which is, in spite of an inadequate channel, increasing each year, demands further improvements than those at present contemplated.

Third. That the commercial prosperity, not only of that section of the State bordering the upper Hudson, but also of the entire State, depends upon a definite plan for the greatly improving of the channel at an early date, and that large manufacturing industries can not be induced to locate on the upper Hudson until such an improvement is positively decided upon.

Fourth. That the barge canal when completed will bring a large amount of additional traffic to the river, and that the canal terminals which are to be located at Albany and Troy will also bring a great amount of water-borne freight to these parts.

Fifth. That the intercoastal chain of waterways as advocated by the Atlantic Deeper Waterways Association will also bring increased traffic to the river, and this inland-canal system, together with the Panama Canal, will, if a proper channel is constructed in the upper Hudson, bring much freight from the Pacific coast as well as Atlantic coast ports to Albany and Troy, to be transferred here or to proceed north or west by canal.

Sixth. That a new water-rail route will doubtless be established in the near future from New York to Chicago and points west, and that this will greatly increase the commerce on the river.

In connection with our statement of July 14, 1911, 15 letters were attached from owners of steamboat lines operating on the upper Hudson and from pilots and captains of some of these boats; 14 of these letters advocated the securing of a deeper channel in the upper Hudson, 2 stated that in their belief the present improvement would be sufficient to properly care for the commerce for the next few years. In addition 4 other letters were written by pilots of steamers operating on the river stating their belief that the 12-foot channel would be all that was needed. It may be interesting to note that 5 out of the 6 who did not favor a greater depth than 12 feet at extreme low water in the upper Hudson were employees of the same line of steamers. Letters were also sent from 4 business men residing in villages situated on the river south of Albany, all favoring the increased depth. We also added to the statement arguments regarding the difficulty of navigating steamers in shallow water as presented by Capt. George A. White, of the Hudson River Day Line. We still further presented a record, which we believed to be approximately correct, showing the freight received at and shipped from Albany during 1910 by water. This record was secured from the receivers and shippers of freight and the railroads, this tonnage amounting to approximately 526,932 tons, having a value of at least $19,125,966.

All of these arguments, letters, etc., we would again bring to the attention of the proper authorities with a request that they be given their most careful consideration.

In passing we would call attention to the fact that the State of New York has placed itself in favor of this proposed improvement and in March, 1909, adopted a resolution favoring a channel 22 feet in depth. (See Exhibit A.)

The Atlantic Deeper Waterways Association has also placed itself in favor of the further improving of the upper Hudson, adopting resolutions at two of its annual meetings at Baltimore, Md., November 18, 1908 (see Exhibit B), and at Norfolk, Va., November 8, 1909 (see Exhibit C).

As additional arguments we would say:

First. A plan for the improvement of the river front at Albany has practically been decided upon, and work will, without doubt, be commenced in a short time on this improvement. The entire dock front will be available for shipping purposes. From Columbia Street north the New York Central & Hudson River Railroad Co. will own the frontage, tracks will run along the wharves, large cranes will be erected at various points and every facility will be afforded for the transshipping of freight.

From Columbia Street south to Island Creek, practically the entire length of the city, the city will own its water front. Modern docks will be constructed, the dock platform will have a width of at least 20 feet, a street 50 feet wide will parallel these docks, and a walk 10 feet in width will be on the inner side of the street. Part of this frontage will be given over to the steamers now stopping at Albany; the balance can be used at any time by any vessel desiring to land here. The improvement will make it possible for tracks to be extended along the entire river front, and also for cranes and warehouses to be constructed at such points as may be needed.

At the south end of the city the Delaware & Hudson Co. own some frontage with two long slips where freight may also be transshipped.

Second. The barge canal terminal will also be constructed here at the earliest possible moment. Work on the plans for this terminal will be commenced early in the coming year. This terminal will be located at the south end of the lumber district on a protected harbor. Into it will run railroad tracks which will be used jointly by all railroads centering here. The city will open up streets to connect with it.

It is further proposed to develop the remainder of the river frontage on this harbor, thus making this a most important shipping center. The city of Albany is doing her part. The State of New York is doing its part. The work done by city and State can never reach its proper efficiency until the Federal Government shall construct in the upper Hudson a much deeper and wider channel than the one now contemplated.

With this report we take pleasure in submitting a resolution unanimously adopted by the New York State Waterways Association at their annual session held in Buffalo. (Exhibit D.) Letters from S. C. Mead, secretary Merchants' Association, New York; Chamber of Commerce, State of New York, N. Y.; James T. Hoile, secretary Manufacturers' Association, Brooklyn; Henry B. Hebert, chairman Canal Association of Greater New York, N. Y.; George Clinton, member International Waterways Commission, Buffalo; H. H. G. Ingalls, Castleton; George R. Lunn, mayor elect, Schenectady; Charles E. Reid, secretary North Side Board of Trade, New York; Herbert R. Peck, Syracuse.

Respectfully submitted.

ALBANY CHAMBER OF COMMERCE,
WILLIAM B. JONES, *Secretary.*

DECEMBER 18, 1911.

EXHIBIT A.

[Resolution adopted by the Senate and Assembly of the State of New York, March, 1909.]

Whereas the great and growing demands of commerce along and upon the upper Hudson River require the widening and deepening of the channel of such river; and

Whereas such river, being a navigable stream, is under the exclusive jurisdiction of the Government of the United States. Therefore

Resolved (*if the Senate concur*), That the Representatives of this State in the Congress of the United States, be, and they hereby are, requested to use every honorable effort to procure an appropriation for the immediate commencement of the work of excavating a channel in such river 400 feet wide and 22 feet deep extending from the city of Hudson to the village of Waterford.

EXHIBIT B.

[Resolution unanimously adopted by the Atlantic Deeper Waterways Association at their annual convention, Baltimore, Nov. 18, 1908.]

That the Hudson River shall be deepened so as to meet in its upper reaches the needs of the traffic upon the improved Erie Canal.

EXHIBIT C.

[Resolution unanimously adopted by the Atlantic Deeper Waterways Association at their annual convention, Norfolk, Va., Nov. 18, 1909.]

That the Hudson River be improved as far as Troy in time to conform to the depth of the proposed Erie Canal now under construction.

EXHIBIT D.

[Resolution unanimously adopted at the convention of the New York State Waterways Association, Buffalo, Nov. 2, 1911.]

Whereas the Hudson River is a most important factor in the commercial prosperity and development of this State and the present channel in the upper reaches thereof is not sufficient in width or depth to properly care for the commerce now carried on the river; and

Whereas this commerce is increasing with each succeeding year by the construction of new and larger steamers, added to the fleet now operated thereon; and

Whereas the commerce of the river will greatly increase upon the completion of the barge canal, together with the modern terminals in connection therewith at Albany and Troy; and

Whereas there is now an improvement under way designed to secure a 12-foot channel at extreme low water with a width of 400 feet in the upper Hudson, which will practically mean 14 feet at mean low water; and

Whereas it is the opinion of those who have given the question their most careful study that the proposed improvement will be inadequate to properly and economically care for the increased commerce which will come to the river within the next few years. Therefore be it

Resolved, That we, the members of the New York State Waterways Association, do hereby earnestly petition the Federal Government to give immediate consideration to the question of the securing in the upper Hudson a channel of an increased depth and width, believing that such a channel is an absolute necessity toward the proper caring for the commerce which will come to the river within the next few years, and also that such a channel is an absolute necessity in order that the commercial prosperity, not only of that section of the State bordering on the Hudson River but also of the entire State, may be properly maintained.

HENRY W. HILL,
President New York State Waterways Association.

A true copy:
ROLAND B. WOODWARD,
Secretary New York Waterways Association.

LETTER OF THE NORTH SIDE BOARD OF TRADE.

NORTH SIDE BOARD OF TRADE,
Borough of the Bronx, N. Y., December 16, 1911.

DEAR MR. JONES: Replying to your letter of the 13th instant, would state that I quite agree with you that the time is now opportune for the deepening of the channel in the upper Hudson to at least a depth of 20 feet, and my opinion is all the more strengthened on this matter, since the people of the State have favorably voted upon the barge canal terminal bond measure, which means that within a reasonable time the barge canal will be finished and vessels plying between the Great Lakes and the Hudson River, and a lesser depth than 20 feet would not be commensurate with this undertaking. I would therefore urge the United States Engineer Corps to deepen the channel in the upper Hudson to a depth of not less than 20 feet.

Would like to have said this in person, but it is impossible for me to be present in Albany on Monday.

Yours, very truly,
CHARLES E. REID,
Secretary.

Mr. W. B. JONES,
Secretary Albany Chamber of Commerce.

LETTER OF MR. H. R. PECK.

SYRACUSE, N. Y., *December 18, 1911.*

Your letter relative to improvement of channel in Hudson River not received in time to be presented to the chamber of commerce for their consideration. Personally, I am in favor of making such improvements in the Hudson River as will increase the usefulness of the barge canal. The advantages to be derived from deepening the river, as presented in your letter, makes this a project which should be seriously considered.

HERBERT R. PECK,
Delegate to the National Convention on Rivers and Harbors.

Mr. W. B. JONES,
Secretary Albany Chamber of Commerce.

LETTER OF THE MERCHANTS' ASSOCIATION OF NEW YORK.

The importance of all waterways connected with the development of commerce which will arise as the result of the completion of the Erie Canal is of the utmost importance to the city of New York, State of New York, and to the commerce of the whole country. The Merchants' Association of New York therefore advocates and urges that the improvement of the upper Hudson River be provided for upon a scale which shall permit the fullest development of the canal and river commerce and shall provide a liberal margin as to depth and width of channels. We had hoped to be represented at the hearing Monday, 18th instant, but illness of our representative prevents. Kindly present this communication on our behalf.

THE MERCHANTS' ASSOCIATION OF NEW YORK,
By S. C. MEAD, *Secretary.*

Mr. W. B. JONES,
Secretary Albany Chamber of Commerce.

LETTER OF MR. G. R. LUNN.

SCHENECTADY, N. Y., *December 16, 1911.*

MY DEAR SIR: I regret that owing to the fact that I am to be in Rochester on Sunday and shall not return until Monday afternoon I can not accept your kind invitation to attend the meeting in the common council chamber on Monday morning next. There can be no question but that the best interests of the people are conserved by an economical opening up of the waterways of the State. I am not sufficiently posted as to the details of the plan to open up the Hudson to give an intelligent opinion as to its value. I should, however, naturally conclude, in line with what I have said before, that the improvement of the channel would be of great benefit not only to Albany and Troy but indirectly to the whole State.

Regretting that I can not be present, I remain,
Sincerely, yours,

GEO. R. LUNN.

Mr. W. B. JONES,
Secretary Chamber of Commerce.

LETTER OF MR. GEO. CLINTON.

BUFFALO, N. Y., *December 14, 1911.*

DEAR MR. JONES: I am in receipt of yours of the 12th instant relating to the hearing before Lieut. Black to be held next Monday. It is with regret that I have to say it will be impossible for me to be present or to prepare an intelligent letter upon the subject, because my time is all taken up in preparation for the trial of an important case which comes off Monday. I have, however, written to the secretary of the chamber of commerce, requesting him to ask the president to appoint some competent person to represent our chamber of commerce and manufacturers' Club.

Yours, very truly,

GEORGE CLINTON.

Mr. W. B. JONES,
Albany, N. Y.

LETTER OF MR. H. H. INGALLS.

CASTLETON, N. Y., *December 13, 1911.*

DEAR SIR: I am in receipt of yours of the 12th inclosing notice of public hearing on the proposition to improve the channel of the Hudson River. I fear I will be unable to be present on the 18th, but should I not you are at liberty to use the data in your files as coming from me, and will also add that the village of Castleton has the right to urge the 20-feet depth because of the conditions below us in which the river usually gorges at Coeymans and floods Main Street, much to the damage of property and hazarding the health of the community, and the people here are satisfied that the shallow water and dyking and choking of the channel by narrowing it has produced these conditions, as they have been very much worse of later years than formerly. I am aware that the Government has made a survey and have denied that the dyking of the channel and filling up of Schodack Creek has produced it, but we can not get away from the fact that since Schodack Creek has been closed, thus shutting up that outlet, that the conditions have been worse than previously. If we had a 400-foot channel with 20-foot depth, we believe this would not occur.

Yours, very truly,

H. H. INGALLS.

Mr. W. B. JONES,
Secretary, Albany, N. Y.

LETTER OF THE MANUFACTURERS' ASSOCIATION OF NEW YORK.

BROOKLYN, N. Y., *December 14, 1911.*

MY DEAR SIR: No one more than myself regrets not being able to be at Albany on the 18th instant. As you know, all of last week was spent at Washington, D. C., and I have returned to a mountain of work, which will take me some time to clean up; secondly, I have the details of a banquet to attend to; and, lastly, we have our regular monthly meeting on the evening of the 18th instant. This you must admit is quite sufficient excuse for my not being at Albany. I am at a loss to understand how it is possible for the United States engineers or any sane individual to question the desirability, and indeed the necessity, for the improvement of the upper Hudson.

These are my views, and I believe they express the sentiment of the membership of this association, and you are at perfect liberty to use this communication in such manner as you may think best.

Very truly, yours,

JAMES T. HOILE, *Secretary.*

Mr. W. B. JONES,
Secretary Albany Chamber of Commerce.

LETTER OF MR. HENRY B. HEBERT.

NEW YORK, *December 15, 1911.*

DEAR SIR: Replying to your esteemed favor of the 13th instant in reference to the United States Government deepening and widening the upper Hudson River, I desire to place myself on record as approving the undertaking.

The Hudson from the harbor of New York to Waterford, N. Y., is the link in the great chain of waterways connecting the Middle West and Northwest with the North Atlantic and with the opening of the barge canal to navigation will become an aggressive competitor with the St. Lawrence for interstate and foreign commerce. The improvement of the upper Hudson is therefore of national importance. Your agitation in support of this work is justifiable and should be encouraged. Much stress is being made in the matter of "American ships to carry American commerce." The slogan should now be American waterways for American commerce. The upper Hudson should be deepened and widened to protect for the American people the nation's commerce originating upon the borders of the Great Lakes, instead of passing out to sea through a foreign country. Sorry I can not be present at your meeting 18th instant. However, I send this letter to represent me.

Yours, truly,

HENRY B. HEBERT.

Mr. W. B. JONES,
Secretary Chamber of Commerce.

LETTER OF THE CHAMBER OF COMMERCE OF THE STATE OF NEW YORK.

NEW YORK, *December 14, 1911.*

MY DEAR SIR: I have your letter of December 13, calling my attention to the hearing which is to be given in Albany next Monday for the purpose of considering the question of further improving the channel in the Hudson River and asking me to be present.

It is not practicable for me to be present that day, but I take pleasure in informing you that the New York Chamber, at its meeting held March 4, 1909, adopted the following resolutions:

"Whereas the unobstructed navigation of the Hudson River is of the greatest importance to the commerce not only of the State but of the entire country; and

"Whereas the channels of the upper Hudson are of insufficient depth for the proper development of commerce: Now, therefore, be it

"*Resolved*, That the Chamber of Commerce of the State of New York urges that in the general scheme for the improvement of the important waterways of the United States the Federal Government should consider the national advantage of including in the scope of its plans for such waterway development the deepening and widening of the channel of the Hudson River up to Troy to a depth and a width sufficient to make it adequate for the present and future requirements of commerce; and also the deepening of the Hudson River between Waterford, at the junction of the Erie and Champlain Canals with the Hudson River, and Troy, so as to accommodate the increased commerce of the enlarged artificial waterways of the State."

You will observe that these resolutions urge the improvement of the upper Hudson River to a depth and a width for present and future commerce. They do not call for any specified depth for the channel, but it is clear from the language of the resolutions that the New York Chamber is in favor of the improvement of the Hudson River, at least so as to make it fully adequate to meet all of the increased commerce to come from the enlarged canals.

Yours, very truly,
SERENO T. PRATT, *Secretary.*

Mr. W. B. JONES,
Secretary Albany Chamber of Commerce.

LETTER OF MR. H. R. PECK.

DECEMBER 20, 1911.

It is necessary, considering the benefits to be derived from the barge canal, to consider that such improvements as are made upon any portion of it, or upon its terminals, are direct benefits to the canal as a whole, and it is also absolutely necessary that no particular city, town, or section shall be granted privileges for the barge canal which in themselves do not add to its general use throughout its entire length.

The project of deepening the Hudson River, as has been suggested, so as to enable larger steamers to come closer to the entrance of the barge canal and giving, as it will, two terminals where cargoes can be transferred—that is, Albany and New York—will avoid congestion and encourage competition, all of which will tend toward cheaper transportation and speedier delivery.

It should be the purpose also to encourage the improvement of the waterways in our State, and while one naturally is more interested in improvements which have local advantage, at the same time an improvement of this kind is but one more step in making navigable our rivers and improving our waterways, which is the foundation upon which rail rate is based and which it is necessary to encourage in order to decrease the cost of transportation.

Those interested in the waterways of our State should give their most earnest consideration to all improvements of waterways which will direct the course of shipments through the State to the port of New York, especially as strenuous efforts are being made upon other waterways which will direct the transportation to ports on the Gulf of Mexico as well as other points along the Atlantic coast. It is appreciated that what benefits New York helps in a measure the entire State; at the same time, in considering matters of this kind, they must be looked at in the broadest light, as no port can maintain its supremacy unless the waterways bringing commerce to that port are increased and improved to keep astride of the developments of other sections.

I sincerely hope that all who are interested in the improvements of the wate ways in this State will look at this question in a broad way and consider the advantages of the State as a whole rather than for some particular locality.

HERBERT R. PECK,
Delegate to National Rivers and Harbors Congress, Syracuse, N. Y.

Papers submitted by Troy Chamber of Commerce in connection with public hearing held December 18, 1911.

TROY, N. Y., *January 6, 1910.*

GENTLEMEN: The chamber of commerce of the city of Troy desires to present to you this statement of facts and considerations which that body believes should influence you in making a report to the legislature in favor of the establishment by the State of terminal facilities at the city of Troy for the canals of the State.

Troy is the proper place for the establishment of such facilities from the natural geographical and business standpoints.

It is the proper place therefor because of local, State, and interstate business and commerce.

It is at the head of tidewater navigation on the Hudson River.

It has 5 miles of river front.

It has a population of at least 80,000.

Outside of Greater New York, it is the fifth city in population in this State.

Opposite this city are the village of Waterford, with a population of 3,119; city of Cohoes, with a population of 23,910; village of Green Island, with a population of 4,644; city of Watervliet, with a population of 14,321; making a population of at least 125,994 within a radius of a few miles (figures of 1905 census).

It has an assessed property valuation of upward of $56,000,000.

It is preeminently an industrial and manufacturing city and is surrounded by growing communities of like character.

The Hudson River bears upon its waters a commerce almost unequaled in quantity and volume by that of any other river in the country.

The Erie and Champlain Canals terminate at Troy, and the vast commerce which it is confidently believed will be carried on the waters of these canals will enter the river at Troy. Terminal facilities should be convenient to the points of entry and discharge of vessels.

The General Government has expended and is about to expend large sums of money in deepening and widening the channel of this river up to Troy.

Abundant testimony can be given by merchants and manufacturers that in former years they received very large quantities, and in some cases all, their freight by boats alongside their docks, and that other local enterprises who desired to receive or ship freight in the same way had the free use of these docks.

The river has, however, not been taken care of as have the railroads; and so in recent years large quantities of coal, ore, and other raw materials, besides manufactured products, have been transported by railroad, to the detriment of river and canal commerce and increased cost to merchants and manufacturers.

There is every reason to believe that this condition of things will cease, and that water-borne commerce will resume larger proportions, because of the deepening and widening of the river, the enlargement of the canals, and the construction of adequate harbors and terminal facilities.

Local trade.—We have said that the local trade and business warrants the establishment of a State terminal at Troy, and in support of this statement we present the following facts:

The General Government in an official publication known as Bulletin 59, issued by the Department of Commerce and Labor, Bureau of Census, in 1905, set out statistics gathered by the Government of the manufactures of the State of New York in the year preceding. It is stated in that bulletin that the figures are "confined to manufacturing establishments conducted under what is known as the factory system, thus excluding the neighborhood industries and hand trades." The showing made by the following figures therein given as to Troy is striking and magnificent:

Number of industries	311
Proprietors and firm members	310
Salaried officials, clerks, etc	1,409
Wage earners	19,114
Cost of materials used	$13,746,280
Value of products, including custom work and repairing	$31,860,829

This is for one year only.

These figures, of course, take no account of the freight received and sent out by the proprietors of wholesale stores, such as the hardware, furniture, groceries, clothing, and dry goods houses, or the stores doing both a wholesale and retail business or the large stores doing purely a retail business. All these stores handle thousands of packages which do not figure in this bulletin, either in the cost of materials used or the value of products of manufacturing establishments.

Since that publication several of the industries of the city have taken on new growth. Large additions have been made to the linen industry. It is well known that Troy is the home of the collar industry; more than nine-tenths of all the collars and cuffs made in this country being produced in the factories of 30 manufacturers here, while the making of shirts is also a considerable portion of the business of these manufacturers. The capital invested in this business represents many millions of dollars; the capital stock of one of the companies operating one of these factories is $17,000,000.

The wages paid out in the collar industry for the year 1907 were upward of $13,000,000.

Most of these factories are on the river bank.

On the river bank also are the Burden Iron Works, the largest horseshoe-making establishment in the country, and where immense quantities of merchant bar iron, staybold iron, boiler rivets, and socket bolts are also turned out and where about 1,500 men are employed.

North of these works is the old and well-known stove foundry of Fuller, Warren & Co.

North of that establishment are the extensive works of the Ludlow Valve Co., where valves of all kinds and sizes are made, from whence they are shipped to all parts of the world, and where several hundred men are employed.

Both of these establishments are on the river front.

North of the Ludlow Valve Works is the extensive freight yard of the New York Central Railroad Co.

Immediately north of that yard is the dock terminal of the Boston & Maine Railroad, at the foot of Adams Street.

The manufacturing industries of Troy are of the most varied character.

It has the leading civil engineering and surveying instrument factory of the world.

The Continuous Rail-Joint Co., making rail joints, employs several hundred men.

The Sirocco branch of the American Blower Co. has recently opened an establishment for the manufacture of fans and blowers, where a large body of men is employed.

Besides the industries above named, our citizens are also engaged extensively in the manufacture of brushes, chains, brick, iron tubing, bells, malt beverages, knit goods, paper boxes, malleable iron, paints, and laundry machinery.

There are—

Persons and concerns engaged in manufacturing	1,297
Persons and concerns engaged in commercial pursuits	1,977
Persons engaged in the various professions	1,082
Of the above there are incorporated manufacturing and business companies	175
And there are transportation companies	16

Upward of 20,000 workers are employed in the industries of the city.

The figures given represent an army of industrial workers, a great body of skilled mechanics, a large annual output, and a large annual pay roll, which means a free circulation of money and extensive demand of the comforts of life.

There is a very noticeable thing in the statistics as to Troy, and that is the large and unusual percentage of persons who are engaged in gainful occupations to the total population of the city.

Opposite Troy and at the junction of the Mohawk and Hudson Rivers is the city of Cohoes.

The same bulletin gives the following data as to that city, to wit:

Number of industries	95
Value of materials used	$6,283,545
Value of products	$10,289,823

There are numerous industries in Waterford, Green Island, and Watervliet—communities which are so situated that they are a part of Troy's industrial life and are essentially identified with this city.

Not by way of disparagement of any of our neighbors, but solely for the purpose of emphasizing the extent and importance of the industries of this city, attention is called to the fact that by the same bulletin it appears that the value of the products of the city of Albany in the same year was $20,208,715, or only about two-thirds of the value of Troy's products; that the value of products of Syracuse, a city with a much larger population than Troy, was $34,823,751; that the number of wage earners in Albany was 8,976 and in Syracuse was 14,578, while in Troy it was 19,114.

We have undertaken to procure some figures of local tonnage and value of Troy's outgoing and incoming water traffic on the Hudson River in 1908, as reported by such of our merchants and manufacturers as responded to the request made by this chamber to that end, and we present the following:

	Tons.	Value.
Lumber and timber	16,100	$212,900
General merchandise	65,854	5,112,000
Raw material, muslin and linen	25,555	8,099,300
Grain, malt, etc	10,200	710,000
Coal, iron, sand, and stone	196,952	975,785
Manufactured products	27,274	7,987,047
Fruit and general produce	2,985	197,000
Cement, brick, fire clay, ice, and plaster	174,555	507,800
Drugs, paints, oil, glass, etc	1,385	296,000
Total	520,860	24,096,832
Estimated increase	371,642	25,949,600
To this may be added:		
Hudson Navigation Co. (Citizens Line) reported to State for 1908	50,188	728,340
Glens Falls Cement Co.:		
Coal	9,419	20,594
Cement and plaster	17,963	126,755
Canal tonnage passing through Troy in 1908	1,366,289	....

Railroad communication.—Troy is a converging point of extensive railroad systems reaching near-by as well as distant territories.

There are here the New York Central Railroad, the Boston & Maine Railroad, the Delaware & Hudson Railroad, the Rutland Railroad, the Hudson Valley Railroad, and the Schenectady Railroad.

We have attempted to procure actual railroad tonnage appertaining to Troy for 1908, but owing to the failure on the part of many to make timely reply, a full statement can not now be presented; but the following, based upon comparison of responses and ratio of amounts given, is believed to be not only conservative, but much less than the facts warrant:

	Tons.	Value.
Lumber and timber	14,221	$465,050
Manufactured products	117,920	37,878,983
Raw material, muslin and linen	33,939	7,911,460
Brick, stone, sand, and fire clay	18,450	564,000
Coal and iron	479,759	4,445,692
General merchandise	102,989	12,586,506
Fruit and produce	600	60,000
Total	767,878	63,911,691

These statements of water and rail tonnage make a most impressive showing of the business belonging to or entering Troy. They speak eloquently of the expansion that would follow from additions to the commercial facilities of the city, and particularly those which would be afforded by cheaper water transportation.

We have said that Troy is now a great distributing point. To the north and east of us are Mechanicsville, Schuylerville, Stillwater, Greenwich, Thomson's, Ballston, Fort Edward, South Glens Falls, Glens Falls, Warrensburg, Hoosick Falls, Bennington, and North Adams. These are beehives of industry, and are alive with manufacturing establishments of varied and important character. Knit goods, wood pulp, cotton goods, paper boxes, paper, agricultural machinery, and cement are made in these places and in mills which are the first in size and capacity in this country. Their operations mean a vast movement of raw materials and of manufactured products. This movement, to-day, is partly by rail and partly by water. The improvement of water facilities would vastly increase the movement by water.

Great quantities of stone, lumber, potatoes, and other bulk freight are shipped from New England to New York, and raw materials for the New England paper, cloth, and other manufacturing industries are moved in the reverse direction.

Sand, coal, stone, and lumber come from the south, and great quantities of merchandise are sent from the north to southern points. The products of the great Northwest are seeking an outlet through the new Barge Canal.

Troy is so situated as to receive and handle vast quantities of the goods turned out in these factories and on their way to market south, west, and east of us. It is so situated as to be a most convenient point for the transshipment of their products to the western parts of this State and to the Western States. It is so situated as to most conveniently handle the raw materials which are shipped to them from New York and southern ports. It is the most accessible and convenient place for the breaking of bulk freight and its distribution to different points. Troy wants this commerce. The natural route for this traffic is by the way of Troy. It is the gateway to Northern New York and the Dominion of Canada. It is the gateway to New England. Its present river and canal service is rapid and extensive. For instance, in 1908, the Hudson Navigation Co. placed in operation between Troy and New York two new steel-frame boats which are upward of 300 feet in length and with a capacity for carrying large quantities of freight.

There is also a freight line running daily between Troy and other cities on the river, like Albany, Hudson, Kingston, Catskill, Poughkeepsie, and Newburgh.

There is also the old and well established Murray's line of barges between Troy and New York, and the newly established freight line of the Manhattan Navigation Co. operating daily between Troy and New York and having two freight stations at Troy.

About two years ago a petition was presented by navigation interests to the Secretary of War, asking that the draw openings of the two upper bridges at Albany be widened and the piers relocated. Among others, that petition was signed by the Cornell Steamboat Co., operating 53 tugs and steamboats; by the Inland Seamen's Union, operating 360 canal boats; by the Erie Boatman's Union, representing 500 boats; by the Catskill & Albany Steamboat Co.; by the Central Hudson Steamboat Co.; by Robinson, Baxter & Dissosway, operating 24 barges and tugs; by the Lake Champlain Transportation Co., operating 250 canal boats for freight between New York and Canada; and by the Jesse Billings Estate, operating about 35 boats. All these companies or individuals do business at the city of Troy, or operate boats upon the Hudson River by and above this city. They represent a vast commercial and property interest, which is deeply concerned in the improvement of the river, and the establishment of adequate terminal facilities for the exchange and handling of freight.

It is confidently asserted that if there was created at Troy a public harbor and canal terminal, with conveniences to accommodate traffic, the traffic would come, and that the present large volume would be greatly increased.

No railroad was ever built for the traffic existing at the time of its construction, but with an eye to the traffic that would come with the increase in facilities.

It seems reasonable to believe that with the completion of the barge canals and the construction of the proposed system of internal waterways along the Atlantic coast, the Hudson River is destined to become a great highway of commerce. Its usefulness will be increased when the Panama Canal shall be opened and Pacific coast products can be shipped by water to the Great Lakes, the Erie Canal being the connecting highway. These works will help make Troy a great water terminal and shipping port. Without, however, waiting for the completion of the Atlantic coast and the Panama Canal works, this city now, from its natural situation and with its present railroad and water communications, has a splendid opportunity to develop commerce to and from New England, northern New York, the Dominion of Canada, and to and from the great West.

Package service.—The completion of our canals, the placing thereon of new and rapid-moving power boats, and the lessening of the time and cost of transportation will result in the carriage upon the canals of many articles which are now transported by railroad. It means the carrying of packages which now ordinarily go by express and rail. The importance of such a service to the industries numbered by the thousands lying in this city, northern New York and the New England States, can not be overestimated.

New England connection.—A leading Troy wool merchant of many years' experience, has stated within a few days that in his judgment 100,000,000 pounds of wool from the Northwest will be transported over the new canal on the way to Boston. This wool now goes almost entirely all rail.

The Boston & Maine Railroad has a terminus in Troy. It is an extensive railroad system, reaching through the New England States. It is the general belief that it is now controlled by the New York, New Haven & Hartford Railroad, another system extending through several of the New England States. These two railroad systems practically gridiron the New England States and minister to the numerous, magnificent, and varied industries of that section of our country. The census of 10 years ago gave these States a population of upward of 5,500,000. The population is now undoubtedly considerably more than that. It is a section of enormous wealth and industrial activity. It is a section dotted all over with mills of all kinds where tens of thousands of skilled and unskilled workers find ready employment.

Its people must be fed by the grain of the West. Manufacturing New England wants to get in closer touch with the Northwest and the Northwest desires to get in closer touch with New England. To do this cheaply and expeditiously, service by water must be kept in touch with service by rail, and at no place near the terminus of the canals can facilities for the interchange and transshipment of freight be as cheaply and expeditiously afforded as at Troy. The grade of the Boston & Maine Railroad is easier than that of any other railroad leading from the upper Hudson into New England, which means a lesser cost of transportation by the Troy route. Shippers will naturally select the cheaper route, other things being equal. No grain is now brought over the Erie Canal on its way to New England. It would find its way on that canal if it could get in touch with a railroad at Troy entering the New England States, and whose interests do not comflict with commerce on the canals. The Boston & Maine is such a railroad. The Boston & Maine and New York, New Haven & Hartford together, constitute a competing line into New York City. Do not forget the importance of locating your terminal at a place where canal commerce will not be throttled by a competing interest. The people of the State will get a return for their immense canal investment if they will give to the canals terminal facilities such as the railroads enjoy, and it is of the highest importance that no mistake be made in the location of these facilities. Otherwise the money expended by the people of the State will have been fruitlessly expended.

Troy is the place where freight consigned to New England should break bulk and be passed from barge into railroad cars. Here is the place where cars carrying the products of the New England factories, consigned to the North and West, can be easily transferred into canal barge. The room is here and the matter is simply one of utilizing it. There is no reason whatever why this work should be done several miles down the river, instead of being done at the junction point of river and canal.

This movement of the chamber of commerce is a movement of citizens connected with the industries of Troy, and is but typical of what the people and government of Troy are ready to do. We do not ask the State or the National Government to help us without being ready to cooperate with them and to help ourselves. Already the common council and the mayor of this city have passed and approved declarations that the city will give its aid toward the improvement of the river and the establishment of harbor facilities. The river is to be kept clear of matter passing into it from city sewers and creeks. The city will seek legislative authority to acquire lands for public warehouses and the securing of the most approved appliances and dock equipment for handling freights. This body, therefore, asks that you will carefully examine into the matters which we present, into the advantages which we possess for helping to make the waterways of the State useful to all its people, believing that if you do this your report will be favorable to the request which we make.

Edward W. Douglas, *Chairman.*
Samuel E. Hutton, *Secretary.*

To the commission created under chapter 438 of the Laws of 1909, for the purpose of studying the questions as to the providing of terminal facilities for the canals of this State.

December 18, 1911.

In complying with the request of R. D. Black, first lieutenant, Corps of Engineers, United States Army, made to the Chamber of Commerce, Troy, N. Y., in date of December 11, that the United States engineering office in Albany, referring to the question of securing increased depth in the Hudson River in connection with the preliminary examination and survey of the river with a view to securing said increased depth ordered by the river and harbor act approved June 25, 1910, in calling for a hearing at the common council chamber, City Hall, Albany, N. Y., on Monday, December 18, 1911, at 10 o'clock a. m., stated that district officer, Col. W. M. Black, requested that parties interested in the navigation and commercial use of the Hudson River appear in order that full advantage may be taken of the opportunity to present all statements and arguments in connection with the proposition of securing increased depth.

Attention is called to the fact that the Hudson River is now being improved under a project which calls for a depth of 12 feet at all times of the year and a channel width of generally 400 feet. The question to come before the hearing relates solely to the advisability of securing a depth greater than that to be provided by this project. The new improvement was thoroughly discussed at the regular monthly meeting of the Chamber of Commerce, Troy, N. Y., held Tuesday evening, December 12, and the officers, directors, and chairmen of standing committees were unanimous in expressing their opinions that the contemplated greater improvement of the river would be of great benefit to the manufacturers, shippers, and business men in general of the city. The secretary was instructed to visit and interview the principal manufacturers and shippers for the purpose of obtaining their views on the subject matter: William J. Bradley, superintendent of the Rail Joint Co.; William Henry Warren, Fuller, Warren & Co., stove and heater manufacturers; Harvey S. McLeod, president McLeod & Henry Fire Brick Co.; Henry S. Darby, secretary and treasurer J. M. Warren & Co., wholesale and retail hardware dealers; F. F. Peabody, president of Cluett, Peabody & Co.; Alba M. Ide, president of G. P. Ide & Co., collar and shirt manufacturers; Martin J. and George A. Straubb, of Emigh & Straubb, collar manufacturers; W. Nelson Ells, president Tim & Co., collar and shirt manufacturers; Thomas F. Fitzgerald, of the Fitzgerald Brewing Co.; James H. Caldwell, president Ludlow Valve Co.; Frank P. McCarthy, secretary of Troy Waist Co.; W. Irving Johnson, Cluett & Sons, pianos. John J. Ryan, president and general manager, United Waist Co., collar and shirt manufacturers; Joseph McKay and John P. Schad, of Hall, Hartwell & Co., shirt and collar manufacturers; James M. Snyder, of Earl & Wilson, collar and shirt manufacturers; G. F. Bond, of the B. Cooper Ice & Coal Co.; Thomas C. Boswell, of the Aird-Don Co., steam fitters and plumbers' supplies; W. W. Loomis, G. V. S. Quackenbush & Co., dry goods; John J. Hartigan, dry goods; James J. Eddy, of Harvey & Eddy, wholesale grocers; William B. Frear, William H. Frear & Co., dry goods; William D. O'Brien, harness dealer, together with others, and without exception each and every one of the manufacturers and shippers are in favor of a 20-foot channel and predict that the commerce on the river will increase to such an extent that the Government will be justified in making the deeper channel.

The following preliminary statement issued November 14, 1911, by Census Director Durand shows an increase in every branch of Troy's commerce which should make a favorable impression on those in authority, who have under their control the bringing of the proposed greater waterway.

MANUFACTURERS IN TROY.

[Tentative summary for 1909 issued by Census Bureau.]

A preliminary statement of the general results of the Thirteenth United States Census of Manufactures in this city was issued to-day by Census Director Durand. It contains a summary comparing the figures for 1904 and 1909, by city totals, prepared under the direction of William M. Steuart, chief statistician for manufactures, Bureau of the Census. The figures are subject to such revision as may be necessary after a further examination of the original reports.

The summary shows percentages of increase as follows: Seventeen per cent in the number of establishments, 20 per cent in the capital invested, 19 per cent in the value of products, 14 per cent in the cost of materials used, 23 per cent in the value added by manufacture, 26 per cent in the number of salaried officials and clerks, 5 per cent in the average number of wage earners, and 23 per cent in the salaries and wages.

There were 363 establishments in 1909, as compared with 311 in 1904, an increase of 52, or 17 per cent.

The value of products in 1909 was $37,980,000 and $31,861,000 in 1904, an increase of $6,119,000, or 19 per cent.

The value of products represents their selling value or price at the plants as actually turned out by the factories during the census year and does not necessarily have any relation to the amount of sales for that year. The values under this head also include the amount received for work done on materials furnished by others.

Tabular summary.—Further details can be drawn from the tabular summary which follows:

	Census—		Per cent of increase, 1904–1909.
	1909.	1904.	
Number of establishments	363	311	17
Capital	$39,309,000	$32,697,000	20
Cost of materials used	$15,626,000	$13,746,000	14
Salaries and wages	$11,602,000	$9,395,000	23
Miscellaneous expenses	$4,861,000	$5,842,000	17
Value of products	$37,980,000	$31,861,000	19
Value added by manufacture, products less cost of materials	$22,354,000	$18,115,000	23
Employees:			
Number of salaried officials and clerks	1,777	1,409	26
Average number of wage earners employed during year	20,020	19,114	5

The information sought for at present is needed to convince the engineers in charge of an increase in commerce so that they may report in favor of a deeper channel. A deeper channel means better speed for our passenger service, more economical maintenance of all boats, and surely with an increased channel an enlarged commerce must result.

LETTER OF THE LUDLOW VALVE MANUFACTURING CO.

TROY, N. Y., *December 16, 1911.*

GENTLEMEN: Agreeable to your recent circular letter in connection with the Government increasing the depth of channel of the river from 12 to 20 feet, would say that for the past five years we estimate our incoming tonnage, consisting of raw material, such as iron, copper, coke, coal, sand, etc., averaged about 20,000 tons per year, valued at about $400,000. Of this amount not more than 700 tons were brought in by water, valued at $850. If conditions had been such as they were when we had the use of the river we would have been able to have brought to our plant by the river at least 10,000 tons of the above at a valuation of $250,000. Our outgoing tonnage was about 9,000 tons, with a valuation of from $900,000 to $1,000,000. Of this tonnage probably 2,000 tons were shipped by water, with a valuation of $225,000. Of this 2,000 tons at least 500 tons were shipped by rail or Murray & Citizens Line and lightered in New York at an expense to us of 30 cents per ton. This latter would have been saved us had seagoing vessels been able to have reached our dock in Troy. We have no doubt our shipments by water could have been considerably increased, as a great deal of our tonnage goes on the Pacific coast which could have been carried by steamships to the Gulf direct from Troy, and from there by rail much cheaper than by all rail; in other words, if seagoing vessels could reach our docks our outgoing tonnage could be increased in making shipments that way. Owing to our inability to get boats to our docks, shipments are now carted to the Murray & Citizens Line. If we could ship from our docks, probably one-half of our tonnage could be forwarded that way at a considerable saving. When we were able to get boats up to our dock some 8 or 10 years ago we brought in the greater portion of our raw material by water at a saving of from 40 to 50 cents per ton.

Yours, truly,

THE LUDLOW VALVE MANUFACTURING CO.,
JAS. H. CALDWELL, *President.*

CHAMBER OF COMMERCE,
Troy, N. Y.

LETTER OF MR. F. F. PEABODY.

TROY, N. Y., *December 16, 1911.*

DEAR SIR: I am informed that there is to be a hearing on the question of deepening the Hudson River to a 20-foot channel. I hope that Troy will make its case very clear to the engineers. If the Columbia River has been worthy of one-half the money that has been spent upon it, certainly the Hudson is worthy of twice the sum the Government contemplates spending. The deeper the waterway the greater its usefulness. Troy, as the head of navigation, should have just as deep a waterway as Albany. I think it would be a serious mistake for the Government to run the deeper channel to Albany only; it ought to be continued to the head of navigation. While this thing is being done it ought to be done thoroughly and to the extent that navigable water will allow, which should include Troy. The terminal facilities for Troy justify this on account of its railroad and canal connections.

The limited dock facilities at New York are pressing business to other ports and much of this could be done here in the river if we but had the channel facilities. The deeper channel is especially needed in view of the tremendous increase in the shipping that will follow the opening of the Panama Canal.

I hope that you will urge upon Col. Black the necessity of deepening the river to Troy so as to enable this port to compete with Albany and other ports along the Hudson.

Very truly, yours,

F. F. PEABODY, *President.*

MR. SAMUEL E. HUTTON,
Secretary, Chamber of Commerce, Troy, N. Y.

Papers submitted by Mr. J. Y. Read, president City Plan Association, in connection with public hearing held December 18, 1911.

LETTER OF THE FEDERAL SIGNAL CO.

ALBANY, N. Y., *December 15, 1911.*

DEAR SIR: In reference to your telephone communication to the writer recently, regarding deep-water channel in the river: We have roughly gone into the matter of volume of our receipts and shipments for the year, and they together amount to about 10,000 tons. This of course includes our manufacturing supplies, such as coal, etc.

Trusting that this information will prove satisfactory we are,

Yours, truly,

FEDERAL SIGNAL CO.,
WILLIAM W. LAVARACK, *Chief Engineer.*

MR. J. Y. READ, *Albany, N. Y.*

LETTER OF THE EASTERN STATES REFRIGERATING CO.

ALBANY, N. Y., *December 15, 1911.*

DEAR SIR: In reference to your request for an estimate of the amount of tonnage which we put out via Hudson River, which goes beyond New York City, would say that on looking back we find that some years we put out more than others; presume that an average of about 250 tons per year would be somewhere around the correct figure.

However, while on this subject, would say that we would probably be able to store a great deal more here in Albany if it were so arranged that ocean-going steamships could come right to our dock here; then the big concerns whom we do business with would, I am sure, be only too glad to store with us, if they could have an export point close to our warehouses. As it is now, they of course are somewhat favorably inclined to store in New York, where they can export direct.

Very truly, yours,

EASTERN STATES REFRIGERATING CO.,
JOHN J. RIEDY, *Manager.*

MR. J. Y. READ, *Albany, N. Y.*

LETTER OF ALBANY CHEMICAL CO.

ALBANY, N. Y., *December 13, 1911.*

DEAR SIR: In response to your request we have to advise you that our shipments by the river, as near as we can get at it, and we have a pretty close figure, is 2,000 gross tons. Many of our shipments, however, which naturally belong to the Hudson River now go out of the country by way of Philadelphia and Boston, owing to excessive freight charges and other difficulties in making shipments from New York City.

Yours, very truly,

ALBANY CHEMICAL CO.,
WM. T. MAYER, *Treasurer.*

MR. J. Y. READ, *Albany, N. Y.*

LETTER OF MESSRS. PATTON & CO.

DECEMBER 15, 1911.

DEAR SIR: At the present time we are handling directly and indirectly from 15,000,000 to 20,000,000 feet of lumber from Canada that goes direct to New York City and vicinity and which we could handle at Albany if a 21-foot channel could be made between Albany and New York City.

Yours, truly,

PATTON & CO.

MR. J. Y. READ, *Albany, N. Y.*

LETTER OF THE EMBOSSING CO.

ALBANY, N. Y., *December 16, 1911.*

DEAR SIR: In response to your request, beg to advise that as nearly as we can estimate it we ship annually about 2,500 tons first-class freight, viz, both rail and water routes. Our receipts are about as follows: Coal, 1,200 tons; lumber, 1,300 tons; box board, 125 tons; miscellaneous (first class), 50 tons; making total receipts of approximately 2,700 tons.

Yours, very truly,

THE EMBOSSING CO.,
G. W. HILLS, *Secretary.*

Mr. J. Y. READ, *Albany, N. Y.*

LETTER OF THE A. P. W. PAPER CO.

ALBANY, N. Y., *December 15, 1911.*

DEAR SIR: Agreeable to your telephone request the other day, we take pleasure advising that our tonnage this year for eleven months ending November 30, outside of shipments made for New York City proper, was 29,720,008.

Trusting that this information will be of service, we are,

Very truly, yours,

A. P. W. PAPER CO.

Mr. J. Y. READ, *Albany, N. Y.*

STATEMENT OF MR. J. Y. READ.

ALBANY, N. Y., *December 15, 1911.*

Total for 1909	59,704,703
Total for 1910	88,777,122

Shipment of lumber: The Government have the above figures.

J. Y. READ.

LETTER OF MR. JOHN T. D. BLACKBURN.

ALBANY, N. Y., *December 15, 1911.*

DEAR SIR: In response to your request, I would say we have received during the past season by water about 10,000 tons of coal and between 7,000 and 8,000 yards of crushed stone.

Yours, truly,

JOHN T. D. BLACKBURN.

Mr. J. Y. READ, *Albany, N. Y.*

LETTER OF MESSRS. BURDICK & SON.

BURDICK & SON,
SHEET METAL SPECIALTIES FOR FOUNDRY PRACTICE,
Albany, N. Y., December 15, 1911.

DEAR SIR: With reference to conversation regarding shipments to and from New York, we receive from New York, Newark, and vicinity approximately 75 tons of supplies yearly. We ship into this district approximately 50 tons of finished goods yearly. We receive from the Steubenville (Pa.) district over the Delaware & Hudson, about 900 tons of metal yearly.

Very truly, yours,

BURDICK & SON.
J. BEDELL.

Mr. J. Y. READ, *Albany, N. Y.*

LETTER OF FULD & HATCH KNITTING CO.

ALBANY, N. Y., *December 15, 1911.*

DEAR SIR: In accordance with your recent request, we made an approximate estimate of the amount we ship to and receive from points beyond New York City by boat, and find that, roughly speaking, our shipments will go well over 650,000 pounds per year, while our receipts from this source will go well over 115,000 pounds per year. These figures are, of course, very rough as shipments vary from month to month to any given locality, and our receipts likewise vary, but we believe that in general, the figures as given come pretty near the actual facts.

Trusting that they will be of some interest to you, we are,

Very truly, yours,

FULD & HATCH KNITTING CO.
A. S. HATCH.

Mr. J. Y. READ, *Albany, N. Y.*

LETTER OF MESSRS. F. C. HUYCK & SONS.

ALBANY, N. Y., *December 28, 1911.*

DEAR SIR: Our total tonnage of raw materials, supplies, and machinery coming in, and finished material going out is at the present time about 5,000 tons per year.

Yours, truly,

F. C. HUYCK & SONS.

Mr. J. Y. READ, *Albany, N. Y.*

[Inclosure F.]

MEMORANDUM OF MR. M. G. BARNES.

JANUARY 25, 1912.

Estimated cost of transporting freight between Albany and New York by car floats.

Fleet.—One tug: Length over all, 106 feet; width over all, 25 feet 6¾ inches; draft, 12 feet; horsepower, 725; cost, $53,000; average speed towing 2 loaded floats, 8 miles per hour; number of men in crew, 8; coal required per hour, 750 pounds.

Two car floats carrying 44 cars: Length over all, 331 feet 2 inches; width, 37 feet ¾ inch; draft (light), 2 feet; draft (loaded), 7 feet; capacity, 22 cars; cost, each, $45,000; headroom required, 22 feet; cost of fleet, $143,000.

Time required to make one trip:

	Hours.
Running time	18.75
Discharging and receiving cargo, say	5.25
Total	24.00

Net cargo.—The net amount of freight hauled at one trip will depend somewhat on commodity handled and whether hauling loaded cars or mixed loaded and empty cars. The report of the public service commission, second district, shows that for ten railroads handling freight in eastern New York for year ending June 30, 1910, the average load per "loaded car-mile" was 19.94 tons and the average load per "car-mile" was 13.62 tons, which includes both loaded and empty cars. For the purpose of this estimate it is assumed that the 44 cars loaded will contain 800 tons, or an average of 18.18 tons per car. An estimate will also be made on the basis of 600 tons per cargo, which is approximately the "car-mile" average above referred found.

Cost of haul.—In finding this cost the following items are included:

Pay roll per day, including subsistence	$40.00
Coal, 750 pound by 24 by $2.50 per ton	22.50
Incidentals, waste, etc	2.50
Rental of 44 cars, at 35 cents per day	15.40
Interest on fleet, per cent	5.00
Repairs and depreciation, percentage of cost	5.00
Insurance, percentage of cost	4½
Percentage per annum, 143,000 by 14½=$20,735.	
Percentage per day on basis of 240 days per year	86.40

Total cost per day of 24 hours	$166.80
Total cost per hour moving freight	6.95
Cost per day in port receiving and discharging cargo	44.00
Cost per hour in port receiving and discharging cargo	6.00
Cost of haul, Albany-New York, 18.75 by 6.95	130.31
Cost of receiving and discharging cargo, 5.25 by 6	31.50
Total cost of one trip	161.81
Cost per ton on basis of 800-ton cargo	.202
Cost per ton on basis of 600-ton cargo	.27

Total cost of transportation:	
Cost of haul	161.81
Profits, 10 per cent on $143,000	59.60
Contingencies and overhead charges	25.00
Total	246.41
Cost per ton on basis of 800 tons cargo	.308
Cost per ton on basis of 600 tons cargo	.41

Check on discussion.—The present towing charge between Albany and New York for canal boats and other vessels is 18 cents per ton, which includes returning the boats light. If it is assured that towing the loaded boats costs twice as much as towing the light boats the charge for towing one way would be 12 cents per ton. Or, in other words, if the tugs could be provided with loads both ways, the charge would be 12 cents per ton each way. Moreover, if tug owners were assured steady runs throughout the season the rate would undoubtedly be lowered. It is assumed for this discussion that the rate would be 10 cents per ton gross load. It is estimated that the average weight of freight cars that would be handled on floats is 17 tons each. Hence, the total weight of the 44 cars is 748 tons, the total tonnage for loaded cars is 1,548 tons, and the towing charge at 10 cents per gross ton amounts to 19.35 cents per net ton. Computed on the "car mile" basis the gross tonnage is 1,348 tons and the towing charge per net ton 22.47 cents. To these charges must be added an amount to cover use of car floats and cars as follows:

Insurance, maintenance, and interest, 14.5 per cent on cost of two car floats ($90,000) per day	$54.38
Rental of cars	15.40
Profits, 10 per cent on $9,000	37.50
Total per day	107.28

No allowance is made for overhead charge, as it is assumed that item is covered in the towing charge.

Hence, cost per ton for use of cars and floats is:	
On basis of 800 tons	$0.134
On basis of 600 tons	.1788

Total cost of transportation:	
On basis of 800 tons—	
Use of floats	0.134
Towing	.1935
Total	.3275
On basis of 600 tons—	
Use of floats	.1788
Towing	.2247
Total	.4035

These results compare very closely with those found by the first method.

Comparison with rail rates.—The freight revenue per ton-mile of haul on the New York Central Railroad for the year ending June 30, 1910, was 6.3 mills, and the average length of haul 195.2 miles. Applied to the distance between Albany and New York (143 miles by rail) the charge would be 90 cents per ton.

On the following commodities, grain, hay, cotton, live stock, dressed meats, anthracite coal, bituminous coal, and lumber, the average revenue per ton-mile on the New York Central Railroad was 6.18 miles per ton-mile for carload lots, and the average haul for those commodities was 253.6 miles. Applying this rate to the Albany-New York division the charge per ton would be 88.3 cents.

The class rates from Albany to New York are:

Class.	Rate.		Class.	Rate.	
	Per hundred weight.	Per ton.		Per hundred weight.	Per ton.
1	$0.26	$5.20	4	$0.13	$2.60
2	.21	4.20	5	.11	2.20
3	.17	3.40	6	.09	1.80

The lighterage charge in New York is 20 cents per ton and the terminal charge 60 cents per ton in addition to the above for all freight requiring such handling.

The New York Central is the only railroad that enters freight directly onto Manhattan Island, and it is stated that 75 per cent of its freight at that terminal is handled by car floats.

Credits.—It will be noticed that in the above discussion interest on the total cost of fleet has been allowed at 5 per cent, and in addition 10 per cent for profits, making a total of 15 per cent in addition to the percentage allowed for depreciation and repairs. The per diem charge for interest and other percentage has been on the basis of 240 working days per year. No credit has been allowed for the work the tug and floats might do in New York Harbor during the winter season.

The rental for cars has been taken at the rate per day that railroads pay for foreign cars. But on the other hand, no credit has been allowed for the decreased amount of oil, waste, etc., nor for the difference in maintenance of rolling stock.

The public service commission report, 1910, page 92, shows the repairs per freight car mile on New York Central Railroad to be $0.0069, and repairs per locomotive mile to be $0.069.

The total repairs for hauling 44 cars by rail from Albany to New York then would be approximately $53.28.

If any considerable number of fleets are in use the overhead charges per fleet will decrease.

Transportation by car ships.—The following is an estimate of the cost of transportation by "car ships" similar to those in use at Detroit equipped as ice crushers.

Car ship:

Length over all	feet	268
Width over all	do	75
Draft	do	10
Horsepower		2,500
Speed miles per hour		8
Capacity	cars	21
Cost of ship		$200,000
Time required to make one trip—		Hours.
Running time		18.75
Receiving and discharging cargo		2.25
Total		21.00

Total cost of transportation:	
Cost of haul per day of 24 hours	$169.57
Profits, 10 per cent on cost of ship	55.55
Overhead charges	25.00
Total cost per day (running)	250.12
Total cost per hour (running)	10.42
Total cost per day (in port)	205.12
Total cost per hour (in port)	8.54
Total cost of 1 trip:	
Running time, 18.75 by 10.42	195.38
In port, 2.25 by 8.54	19.22
Total cost for one trip	214.60
Total cost per ton on basis 382 tons	.562
Total cost per ton on basis 286 tons	.75

Remarks.—This discussion shows that computed on the "car-mile" basis freight can be transported between Albany and New York on car floats at a profit for less than half the through rate on carload shipments and on car ships for about 80 per cent of the through rate for carload shipments. Computed on the full car basis a very much better showing is made.

It is true that most freight could be hauled more cheaply in bulk on boats, but the disadvantages are:

(1) Such a method requires rehandling and sorting at both terminals.
(2) Goods are broken and damaged by extra handling.
(3) Delays and loss of goods result from the extra handling.
(4) Refrigerator freight can not be unloaded from cars until it has reached its destination without serious damage.

The advantages over rail shipment are:

(1) Relieves railroads from freight congestion.
(2) Provides a means of transportation that can be used in case of wrecks on railroads.
(3) Permits closer connection between southern and northern roads.
(4) Expedites handling freight at New York Harbor, where nearly all is done by car floats.
(5) Permits more careful transport of freight and less wear on cars.

This method of handling freight could be expanded to permit the use of automobile trucks and trailers for same. The use of such a method would permit of the transportation of freight from producer to consumer with the minimum of handling and crating and in the safest and most expeditious manner.

Freight is now being handled by auto trucks and trailers at a profit on the country roads for less than 3 cents per ton-mile. The use of such carriers in connection with the canals will greatly increase the field of usefulness of each and materially reduce freight rates.

M. G. Barnes,
Consulting Engineer.

[Inclosure G.]

Report of Lieut. R. D. Black, Corps of Engineers, on factors affecting the safe and economical operation of boats in a restricted channel in the Hudson River.

1. An examination of the existing published data on this subject yielded the following information:

(*a*) From experiments in a model tank using models of steamers of the Hudson River Day Line, length, 396 feet; beam, 47 feet; draft, 7 feet 6 inches, Prof. Herbert Sadler, dean of the department of naval architecture of Michigan University, has deduced a set of curves showing for that type of boat the relation between indicated horsepower and speed for a number of depths (pl. 2).

(*b*) From a set of observations made by the United States under the supervision of H. N. Babcock, United States assistant engineer, on screw steamers operating in a relatively deep channel near Sandy Hook, N. J., the data contained in the following table were obtained:

Draft of vessel at pier.		Draft in channel.	Depth of water in channel.	Squat.	Velocity of vessel in miles per hour.
Bow.	Stern.				
24.6	25.8	29.2	31.7	3.4	18.0
24.0	26.0	29.0	32.3	3.0	15.2
29.1	29.5	32.1	35.8	2.6	17.9
24.3	25.2	26.7	33.3	1.5	15.2
22.2	24.7	25.8	37.7	1.1	14.5

(*c*) Other important data bearing on these subjects have been obtained from researches of Naval Constructor Isherwood, R. E. Froude, Capt. A. Ramousau, and Sir William H. White, and from the report of the board of engineers on deep waterways. A search for further data on this subject, carried on under the auspices of the American Society of Civil Engineers, failed to produce much other information, applicable to conditions on the upper Hudson.

2. In order to obtain at first hand data on which to amplify and verify relations shown theoretically to exist between draft, speed, power, and channel cross section,

a series of observations were carried on in the Hudson River during the months of September and October, 1911.

Two points for observation were selected, viz., at Bogart Island, 2 miles below Albany, N. Y., and at West Point, N. Y. At the first point the channel conditions were as follows: Channel depth, 12 feet; average width of river, 770 feet; cross-sectional area at lowest low water, 5,700 square feet; for each foot of increased depth produced by tidal action, 770 square feet were added to cross-sectional area. Steamboats were timed over a course 400 feet long. At the second point the channel depth was 135 feet and the cross-sectional area was so great as to have no influence on speed or squat.

Observations were taken on the steamers of the Hudson River Day Line, *Hendrick Hudson*, *Robert Fulton*, and *Albany*. Readings were taken of the changes in water elevation, of the speed of the vessel, of the current velocity, and of the elevations of a predetermined point on the moving boats. From these readings and from measurements made at the dock just before the vessel's departure, the squat was computed. The size and character of the swells were recorded as far as practicable. The officials of the Day Line cooperated by running at various speeds asked for and endeavoring to furnish a record of the power used. Available time and funds did not permit of as much work as could have been desired, and it was seldom possible to get more than one set of observations under exactly similar conditions. Consequently, the more general relations deduced are not thoroughly substantiated.

3. Without giving here in full the results of the field work of which the observed data are recorded in plate 1, the following somewhat striking observations are selected as being especially typical and interesting:

(*a*) In about 135 feet of water, at a speed of 22.5 miles per hour, the steamer *Hendrick Hudson* squatted 0.99 foot at her stern, and her swell was practically inappreciable at a distance of 1,000 feet.

(*b*) In the same depth this steamer, at a speed of 11.5 miles per hour, squatted 0.15 foot at her stern.

(*c*) In 17 feet of water, at a speed of 8.88 miles per hour, the squat of the *Robert Fulton* was 0.55 foot, and the maximum height of the swell was 2.5 feet at about 250 feet from the vessel.

(*d*) In 15.5 feet of water, at a speed of 7.03 miles per hour, the squat of the *Robert Fulton* was 0.75 foot and the height of the swell was 3.6 feet.

(*e*) In 12.4 feet of water at a speed of 11.05 miles per hour, the squat of the *Robert Fulton* was 3.15 feet.

(*f*) In 14.4 feet of water, at a speed of 9.14 miles per hour, the *Hendrick Hudson* squatted 1 foot using 350 horsepower.

(*g*) In 13.9 feet of water, at a speed of 9.48 miles per hour, the *Hendrick Hudson* squatted 3.25 feet, using 730 horsepower, with a swell 3.7 feet high.

Observations c, *d*, *e*, *f*, and *g* were taken at the same point in the river at different stages of the tide. Observations *f* and *g* are particularly interesting. The depths were nearly the same. In observation *f* the steamer was running at what her officers consider her most economical speed for this depth. During observation *g* they were endeavoring to force her to the limit, utilizing enough power to drive her at high speed in deep water, and had reduced her clearance to almost zero. These two observations furnish an example of the great influence of shoal water on power consumption and possible speeds. In view of the apparent discrepancies between observations *d* and *e* and *f* and *g*, it should be noted that the *Robert Fulton* is a smaller vessel than the *Hendrick Hudson*.

4. As stated earlier, a tabulated record of the field observations is appended hereto as plate 1. This table contains some data on all of the elements entering into the solution of the problem, except a record of the indicated horsepower during each observation. The *Hendrick Hudson* is equipped with a three-cylinder, compound, inclined, direct-connected engine, and the other steamers with low-pressure walking-beam engines. All are side-wheel steamers. Several attempts were made to obtain the horsepower consumption by taking indicator diagrams, but, on account of the character of the engines and the great expense involved it was found impracticable to obtain, by this method, a reliable horsepower record for any considerable number of observations. A record of the number of revolutions per minute and the steam pressure was kept, but the results obtained in computing the power from this data were so diversified and unreliable that they have been rejected. Hence, it has been necessary to compute the power consumption.

5. From his experiments in the model tank Prof. Sadler has platted three speed-power curves for speeds between 7 and 21 miles per hour, one curve for a depth of 15 feet, one for a depth of 20 feet, and one for "deep water," meaning water so deep that the effect of the bottom is inappreciable. A study of these curves, in connection with the data obtained in the field, indicates that for power consumption under 1,000 horsepower curves for depths of 12, 13, 14, 16, 17, 18, and 19 feet can be interpolated with

reasonable assurance of accuracy. This gives a set of curves showing within limits the relation between power consumption and speed for these depths for the model of boat used. These curves are appended as plate 2.

6. In Prof. Sadler's curves the horsepower was deduced theoretically from measurements of the resistance of his models to towing. The field observations induce the belief that a vessel moving under her own power squats much more than when being towed, and that this increased squat greatly increases her resistance to motion. Hence Prof. Sadler's values for horsepower are believed to be materially lower than the actual power required in shoal water where the squat is great. It is thought, therefore, that the results of the deductions hereinafter based on Prof. Sadler's relations between speed and power are exceedingly conservative and give values of squat and power actually too low for corresponding depths and speeds.

7. By a careful analysis of the field data on plate 1, the speed-power curves on plate 2, and the limited record of actual power consumption available, the following conclusions were reached:

(*a*) Assuming that for a given depth the indicated horsepowers vary directly as some function of the velocities and using the equation—

$$\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}=f\frac{(V_1)}{(V_2)}$$

where V_1=the smaller velocity, it was found that for any depth between 12 and 17 feet and for speeds between 7 and 11 miles per hour the equation will have this form—

$$\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}=0.73\frac{(V_1)}{(V_2)}$$

(*b*) Assuming that for a given depth the squats vary directly as some function of the indicated horsepowers and using the equation—

$$\frac{S_1}{S_2}=f\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}$$

where $(\mathrm{I.\ H.\ P.})_1$=the smaller value for indicated horsepower, it was found that for any depth between 12 and 17 feet and for speeds between 7 and 11 miles per hour the equation will have this form—

$$\frac{S_1}{S_2}=1.45\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}$$

(*c*) Assuming that for a given velocity the indicated horsepowers vary inversely as some function of the depths and using the equation

$$\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}=f\frac{(d_2)}{(d_1)}$$

where d_1=the smaller depth, it was found that for any depth between 12 and 17 feet and for speeds between 7 and 11 miles per hour, the equation will have this form

$$\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}=0.96\frac{(d_2)}{(d_1)}$$

(*d*) Combining the equations in (*b*) and (*c*) we have

$$\frac{(\mathrm{I.\ H.\ P.})_1}{(\mathrm{I.\ H.\ P.})_2}=0.96\frac{(d_2)}{(d_1)}=0.69\frac{(S_1)}{(S_2)}$$

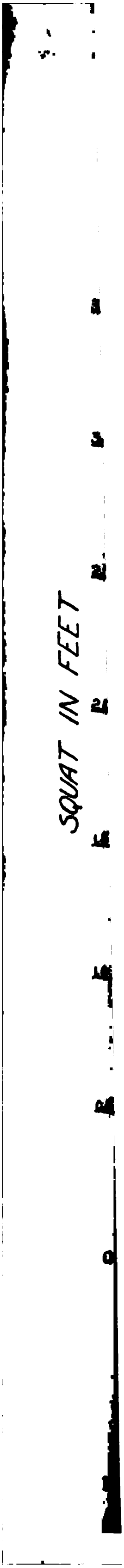
$$\frac{S_1}{S_2}=1.39\frac{(d_2)}{(d_1)}$$

All of the above relations are approximate and hold only for the speeds, depths, and model indicated. The results of the above deductions are shown in the form of curves on plates 3, 4, and 5.

8. These relations were deduced for and apply exactly to one class and size of steamer only. By using Froude's Laws of Comparison, a similar set of relations may be obtained for other types. However, for use in determining channel requirements in the upper Hudson, it is thought proper to assume that the relations as given above apply to a vessel not over 500 feet long, with beam over guards of 90 feet, beam of hull 60 feet, and a load draft at rest of 10 feet as the standard steamer to be accommodated. Under these assumptions the following deductions can be made:

(1) That in 12 feet of water, safe clearance can not be maintained.

(2) That in 13 feet of water safe clearance can be maintained with a speed less than 8 miles per hour.


SQUAT IN FEET
0

(3) That in 14 feet safe clearance can be maintained with a speed of 10½ miles per hour, but that at this speed the power consumption will be uneconomical and the swells damaging.

(4) That in 16 feet a speed of 12 miles per hour can be maintained safely and economically.

(5) That speeds greater than 14 miles per hour are uneconomical or unattainable except in very deep water.

The large steamers of the Day Line are designed to operate economically at a speed of 20 miles per hour in deep water. They are scheduled to make the run from New York to Albany as a daylight trip in about 10 hours, and the volume of their through business depends largely on the time element. At present the average speed of both day and night boats north of Hudson is from 7 to 12 miles per hour. The night boats are designed for an economical speed of 15 miles per hour. As they make no stops between Albany and New York, the question of speed is not so important to them as to the Day Line. The most important benefits to be gained by an increase in depth would be, for the day boats, greater speed, and, for both day and night boats, economy in power and a safe clearance.

9. With respect to freight traffic, two elements are of particular importance: The draft of towboats and resistance to motion of barges either self-propelled or under tow. The volume of the prospective traffic to and from the barge canals has been estimated at 15,000,000 tons per annum. The local tonnage and that transferred by rail amounted to about 3,700,000 tons in 1910. Making due allowance for the business of the passenger steamers, a very conservative rate of increase would place the probable total barge traffic on the river at about 20,000,000 tons per annum. This would require 20,000 cargoes per annum, if the average cargo is 1,000 tons.

10. Experience has shown that from 13 to 15 feet is the most economical draft for towboats of the type used on the lower Hudson and in New York Harbor. As noted above, shallower draft boats are now in use on the upper Hudson for heavy work because only of lack of channel depth now and in the past. At slow speed, when pulling, the propeller tugs do not squat appreciably. Hence, with 16 feet of water, a 14-foot tug can maintain a 2-foot clearance, while, to a far greater degree than in the case of passenger or freight carriers the slow-moving, relatively small, stoutly built tug can operate on less clearance with comparative safety. Based on the best boats now in service on the Hudson, the following seems to be the limiting indicated horsepowers practicable for various draft tugs:

Draft.	Indicated horsepower.
6 to 8 feet	150- 300
8.5 to 10 feet	500- 800
13 to 15 feet	1,000-1,800

With equal indicated horsepowers, the pulling power generally increases with the draft. The smallest tugs in service are operated with a crew of 9 men, and the largest with a crew of 12 men. For a given total pulling power, however, the coal consumption varies more nearly with the total horsepower required, however distributed between tugs. The cost of wages and repairs is more nearly a function of the number of boats. These figures give some idea of the economy in using deep-draft boats.

11. It has been found, by experiments and experience, that the standard formulæ for resistance to motion in general use in marine architecture do not give reliable results for the channel conditions prevailing on the upper Hudson. The best available guide is believed to be contained in curves deduced by Prof. Sadler as a result of his model-tank experiments referred to above, and are presented in an article entitled "The Resistance of Some Merchant Ship Types in Shallow Water," read at the eighteenth general meeting of the Society of Naval Architects and Marine Engineers, on November 16 and 17, 1911. Based on his curves for "full type of cargo boat," the following table of resistances and effective horsepowers were computed for a barge 270 feet long and 40 feet beam, drawing 9.5 feet. The effective horsepower is that computed as necessary to exert the towline resistances given.

Towline resistances.

Speed.		Towline tension in tons.			Effective horsepower required to overcome towline tension=one-half indicated horsepower.		
Per hour.	Per second.[1]	D.=12.[1]	D.=14.[1]	D.=16.[1]	D.=12.	D.=14.	D.=16.
Miles.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
4	5.866	1.35	0.75	0.66	28.8	25.7	23.5
6	8.8	2.1	1.5	1.35	67.5	48.0	43.0
8	11.74	5.25	3.0	2.55	251.4	128.1	108.86

[1] Compiled by Prof. Sadler.

Records of actual coal consumption over an extended period show that a modern tug belonging to the Standard Oil Co. used when pulling at an average speed of 6 miles per hour in deep water 250 pounds of coal per mile, or 1,500 pounds per hour. Assuming that she was utilizing her full rated power and that the effective horsepower exerted on the towline is one-half the indicated horsepower, and using the figures for tractive resistance and effective horsepowers given in the above table, we then get the following figures for the coal consumed by this boat in pulling one hypothetical barge 1 mile with different depths of water:

Coal consumption in tons (2,000 pounds).

Speed per hour.	Depth in—		
	12 feet.	14 feet.	16 feet.
Miles.			
4	0.0216	0.0189	0.0176
6	.0337	.0240	.0215
8	.0943	.0480	.0408

12. In the 38 miles between Troy and Hudson there are about 8 miles of channel with a natural depth greater than 12 feet at lowest low water, or 30 or more miles of channel to be dredged under the existing project. With a 12-foot depth the coal consumption at 4 miles per hour would be about 0.648 ton, and with 14-foot depth, 0.568 ton, while at 6 miles per hour it would be 1.012 and 0.720 tons for these two depths, respectively, effecting a saving of from 0.1 to 0.3 of a ton for each trip with a single barge between Troy and Hudson with a 14-foot channel. It will be noted that the above deduction makes no allowance for loss in efficiency in the tug when operating in shoal water, a loss which is not inconsiderable and affects the utilization of only a small part of her power. In a stationary dynamometer test under favorable conditions one of the Hudson River tugs lately pulled 7,600 pounds, developing 176 indicated horsepower. Taking the effective horsepower exerted on the towline as one-half the indicated horsepower, her maximum speed pulling 7,600 pounds would then be 6.37 feet per second, or 4.34 miles per hour, from the following equation:

$$\text{E. H. P.}=\frac{\text{I. H. P.}}{2}=88=\frac{7{,}600\ V}{550}.$$

V=speed in feet per second.

Her towline pull would then be 3.8 tons (of 2,000 pounds) at 4 miles per hour, 2.75 tons at 6 miles per hour, and 2.061 tons at 8 miles per hour. Referring to the table given above, she could then pull in 12 feet of water:

3 barges at 4 miles per hour.
1.8 barges at 6 miles per hour.
1 barge at 8 miles per hour.

In 14 feet of water:

5 barges at 4 miles per hour.
2.5 barges at 6 miles per hour.
1.2 barges at 8 miles per hour.

In 16 feet of water:

- 6 barges at 4 miles per hour.
- 3 barges at 6 miles per hour.
- 1.5 barges at 8 miles per hour.

Or with 3 barges the boat could save about 2 hours in the run between Troy and Hudson if she had 14 feet of water instead of 12 feet, or at a speed of 4 miles per hour could haul nearly twice as many barges. The coal consumption of this tug when pulling at full power is between 1,500 and 2,000 pounds per hour. Hence, in hauling three barges from Troy to Hudson she would save about 2 tons of coal. Hence, if this tug carried 15,000,000 tons per annum between Troy and Hudson, 3 barge loads averaging 1,000 tons each at a time, her annual saving in coal would be about 10,000 tons, or, at $3.25 per ton, $32,500 per annum. If a speed of 4 miles per hour is maintained, her coal consumption per mile would be about 350 pounds. With 12 feet of water her maximum load is three barges; with 14 feet, 5 barges. The coal consumption per barge would then be about 3,500 pounds for the run with 12 feet of water, or 2,100 pounds for 14 feet of water. Thus the deeper water effects a saving of about $2.26 per barge. With 15,000 barge loads the annual saving in coal would be $33,900.

13. The above deductions are based on assumptions which are not fully substantiated and formulæ which are not strictly applicable to the conditions. However, the results are consistent with actual practice as far as ascertainable. From the records of the largest towing company on the river it appears that the average coal consumption between Albany and Hudson is 33 per cent of the total between Albany and New York, while the distance from Albany to Hudson is about 30 miles and from there to New York about 120 miles. The towing time between Hudson and New York is from 24 to 30 hours and between Albany and Hudson from 7 to 12 hours. During high water the tug *Pocahontas* (one of the most powerful in service, with normal draft of 13 feet), with a load of about 25 canal boats, takes about 4 hours to run 14 miles from Albany to New Baltimore, with a depth of from 12 to 14 feet, and 2 hours to run from there to Four Mile Point (12 miles), with a depth of from 15 to 17 feet, but including a few bad shoals. The tug *Murray*, of about 300 indicated horsepower, made during the last year 107 round trips between Albany and New York, towing 1 large barge, drawing 9 feet. From his actual observations her engineer computes that a difference in depth of 2 feet, resulting from tide or freshet, effects an average saving of one-half ton of coal between Albany and New Baltimore.

PLATE 1.—*Fieldwork from Sept. 25, 1911, to Oct. 23, 1911, to accompany report on preliminary examination of Hudson River submitted Feb. 9, 1912.*

[Data obtained from Hudson River investigations of the squat of vessels.]

1	2	3	4	5	6	7	8		9	10		11	12	13	14		15	16	17
Date.	Place.	Name of steamer.	Speed of steamer relative to shore per hour.	Current velocity per hour.	Speed of steamer relative to water per hour.	Depth of water along axis of steamer.	Drop from normal elevation.		Tide gage reading before effected by steamer.	Tide gage readings as steamer passes.		Total difference in elevation.	Total fall from normal elevation.	Wave height, maximum.	Instant of passage.		Instant of highest water.	Instant of lowest water.	Approximate distance of axis of steamer from station A.
							Bow.	Stern.		Maximum.	Minimum.				Bow.	Stern.			
1911.			*Miles.*	*Miles.*	*Miles.*							*Feet.*	*Feet.*		*hr. m. s.*	*hr. m. s.*	*hr. m. s.*	*hr. m. s.*	
Sept. 25	Bogart Island	Fulton	7.79	−0.76	7.03	15.50	0.65	0.75	4.50	6.00	2.40	3.60	2.1	6.00	8 46 10	8 46 30	8 46 40	8 46 30	250
26	do	Albany	11.10	− .69	10.41	15.70	1.46	2.20	4.60	7.00	4.00	3.00	.6	7.00	44 10	44 30	44 40	44 30	250
27	do	Fulton	9.74	+ .35	10.09	15.00	1.36	1.60	4.60	5.00	4.00	[1] 1.00	.6	5.00	45 00	45 20	45 30	45 20	250
27	do	Hudson	10.20	......	10.20	15.75	(2)	1.35	4.80	4.40	4.30	[1] .10	.....	4.40	43 10	43 30	43 40	43 30	250
28	do	do	9.74	......	9.14	14.40	.90	1.00	4.50	4.50	4.20	.30	.3	4.50	45 20	45 50	46 00	45 50	250
28	do	Fulton	10.45	+ .32	10.77	12.60	1.65	3.10	2.50	3.70	.30	3.40	2.2	3.70	42 50	43 10	43 20	43 10	250
29	do	do	10.45	+ .32	10.77	14.60	1.13	2.40	4.10	5.00	2.22	3.80	1.9	5.00	47 30	47 50	48 00	47 50	250
29	do	Hudson	10.90	− .45	10.45	13.70	1.25	2.62	3.70	5.50	1.50	4.00	2.2	5.50	45 10	45 30	46 40	46 30	250
30	do	do	9.10	+ .38	9.48	13.90	1.31	3.25	2.80	4.50	.80	3.70	2.0	4.50	50 40	51 00	51 10	51 00	250
Oct. 2	do	Fulton	10.20	+ .85	11.05	12.40	.26	3.15	2.15	3.70	.50	3.20	1.6	3.70	47 40	48 00	48 10	48 00	250
3	do	Hudson	9.10	+1.10	10.20	12.60	.85	1.26	2.85	3.70	2.50	1.20	.3	3.70	46 10	46 30	46 40	46 30	250
5	do	do	8.52	−1.10	7.42	13.20	.75	.95	3.90	4.00	3.50	[1] .50	.4	4.00	47 20	47 40	47 50	47 40	250
6	do	Fulton	10.20	−1.16	9.04	13.50	.45	1.26	3.50	3.50	1.10	2.40	2.4	3.50	46 30	46 50	47 00	46 50	250
10	West Point	do	20.50	−1.08	19.42	135.00	.34	.48	2.80	2.80	2.80	......	.....	2.80	....	....	....	....	1,000
10	do	Hudson	23.00	− .51	22.49	135.00	.19	.99	2.00	2.00	2.00	......	.....	2.00	....	....	....	....	1,000
11	do	Albany	21.00	+ .80	21.80	135.00	− .44	.16	2.90	2.90	2.90	......	.....	2.90	....	....	....	....	1,000
11	do	Fulton	16.50	− .49	16.01	135.00	.17	.45	2.75	2.75	2.75	......	.....	2.75	....	....	....	....	1,000
12	do	Hudson	12.00	− .46	11.54	135.00	− .10	.15	2.80	2.80	2.80	......	.....	2.80	....	....	....	....	1,000
12	do	Albany	12.00	− .16	11.84	135.00	.15	......	2.90	2.90	2.90	......	.....	2.90	....	....	....	....	1,000
13	do	Hudson	18.00	......	18.00	135.00	− .12	.48	1.65	1.65	1.65	......	.....	1.65	....	....	....	....	1,000
13	do	Fulton	13.00	......	13.00	135.00	.08	.15	2.90	2.90	2.90	......	.....	2.90	....	....	....	....	1,000
20	Law	do	10.90	−2.02	8.88	17.00	.05	.56	6.90	8.00	5.50	2.50	1.4	8.00	8 49 00	8 49 20	8 49 30	8 49 20	250
21	do	Albany	11.90	−2.02	9.88	17.00	.22	1.02	6.90	8.10	4.50	3.60	2.4	8.10	50 50	51 10	51 20	51 10	250
23	do	Fulton	12.50	−1.70	10.80	17.50	1.25	2.05	7.50	10.00	7.00	3.00	.5	10.00	45 10	45 30	45 40	45 30	250

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[1] Result doubtful.

[2] The buoy marking position of bow was lost.

The time given in columns 14, 15, and 16 is correct to nearest 5 seconds.
Column 5 (−) sign indicates a current adverse to progress of steamer; (+) sign indicates a current adding to progress of steamer.
Column 8 (−) sign indicates a rise above normal elevation.
Squat is given in column 8.

[Mortimer G. Barnes, civil and hydraulic engineer.]

ALBANY, N. Y., *March 25, 1912.*

GENTLEMEN: I am in receipt of a letter from Col. W. M. Black, Corps of Engineers, United States Army, stating that he had forwarded to you his report on an examination of the Hudson River as authorized by river and harbor act approved June 25, 1910. Col. Black stated in his letter:

"I am constrained to report that a further improvement of the upper Hudson River with a view to obtaining increased depth over that called for under the approved project should be postponed until the opening of the New York State barge canals and the character and volume of the commerce of the upper Hudson and the types of vessels used by the trade shall have become manifest and the economic necessity for the increased depth shall have been proved."

He further says that parties interested have the privilege of an appeal from his decision to your board, but such appeal must be made on or before three weeks from the date of his letter March 5, 1912.

The president of the Albany City Plan Association has instructed me to file a brief with your board strongly protesting against the findings of Col. Black. It is respectfully submitted that time is too short in which to make an intelligent appeal. Moreover, it is impracticable to do so without access to Col. Black's report, and as I have no means of knowing what he has reported, consequently can not reply to his arguments. It occurs to me, however, from the above quotation from his letter of March 5, that he has overlooked one of the essential arguments presented to him at a public hearing in Albany, December 18, 1911, namely, that the proposed deepening of the Hudson River to the Capital district is not alone a question of local importance, but it is believed that however important it is for this locality it is of deeper or greater importance to the country at large, especially to the territory east of the Mississippi and north of the Ohio Rivers. As a further evidence that he has overlooked the national importance of the enterprise it is noted in the communciation received from him that he has notified only the United States Senators from New York, Hon. W. H. Draper, House of Representatives, Washington, D. C., and the commercial bodies of the Capital district. Communications received from Ex-Senator Henry W. Hill, Chairman of the Executive Committee on the Improvement of New York State Canals, states that in his opinion this is a question of great importance to the localities above mentioned and should receive the hearty cooperation of those localities, but that time is too short to compile statistics and present an appeal to your body.

I will endeavor to anticipate some of Col. Black's objections to improving the Hudson to accommodate sea-going vessels to the Capital district from some remarks that were made at the public hearing held in Albany.

(1) He points out that Newburgh, for example, has never become a great transfer point between sea-going vessels and railroads, and cites that as an example, showing that Albany would not become such a transfer point even if it had adequate width and depth of channel. In reply to this argument I beg to invite your attention to the relative importance of the two cities. Newburgh is only reached by one railroad entering the Chicago district, that being a branch line of the Erie, and the Erie Railroad has a complete terminal equipment on the river opposite Manhattan Island, and a subterminal at Newburgh would only cut off 30 miles of its distance between New York and Chicago. Hence, it would be poor business for the Erie to go to the great expense of equipping another terminal so near its main terminal until freight congestion had made such expenditure necessary; and when the terminals at Newburgh were found necessary it would not be in order to cheapen freight rates, but simply as an overflow point. Moreover, the topographic and physical conditions are such that the alignment and grades from Newburgh eastward and westward are not as favorable for railroad construction and operation as at Albany, where the New York Central has at present six tracks following the Mohawk River on good alignment and very easy grades to the west. Moreover, Albany is at the focal point of railroads reaching north to Montreal and east and northeast to all New England points. Again, the distance from Albany to Chicago by railroad is at least 200 miles shorter than the distance between New York and Chicago via railroads running westward from New York. Albany is also located at a division point of the New York Central, Delaware & Hudson, and the Boston & Maine Railroads, as well as numerous electric railways doing a freight and passenger business. The topography along the Hudson River at the Capital district is such as to permit of its being improved into splendid terminals for all these railroads, there being at least 10 square miles of water front that can be thus improved where terminals and harbors can be constructed greatly excelling those of the New York Central and other railroads in New York City and on territory now unused that can be purchased at a nominal figure. Hence Albany can be made a transfer station for freight destined for all points north, east, and west, while New-

burgh can never become such a transfer point except as a necessary overflow for New York City.

(2) It was mentioned that the lower Hudson was subject to dense fogs and hence would make navigation dangerous at night. It may be admitted that fogs occasionally occur in the summer season, but navigation is not necessarily dangerous, as the Hudson River has ample width for the meeting and passing of all vessels, and as further evidence that navigation is safe there is at present a large river commerce carried on in fleets of from 4 to 60 canal barges per fleet and river steamers from 400 to 500 feet in length and upward of 90 feet beam, designed to carry 5,500 passengers and making a speed of 20 miles per hour. If the river in its present condition is safe for such navigation it surely will be sufficiently safe for a freight business on which commerce can be carried at a lower rate of speed and no serious financial loss will result by delays until fogs have raised. Moreover, the number of foggy days and nights on the Hudson River will not exceed those of St. Marys River, where the traffic has amounted to over 60,000,000 tons in a season of eight months, and the difficulties in navigating the St. Marys River are more than those encountered on the Hudson, on account of the tortuous and narrow channels through rocky beds and banks.

(3) It has been urged that seagoing vessels would not use the channel owing to the dangers to navigation and the lower speed required. It is not believed this point is well taken. The same argument has been urged against other ship canals, especially in European waters. That was one of the strongest arguments presented against the construction of the Manchester Ship Canal at the time it was being promoted, but the history of that canal shows that within six months from the time of its completion 630 seagoing vessels docked at Manchester. When that canal was nearing completion its opponents insisted that the larger seagoing vessels would never be able to dock at Manchester, and pointed to the largest cargo boat afloat at that time, *The Samoa*, as an example of a ship that could not navigate the canal. However, within a short time after the completion of the canal that vessel successfully reached Manchester with a full cargo, bringing the largest cargo of cotton that ever left the port of Galveston.

Comparing the Manchester Canal with the Hudson River, the latter has a channel of unrestricted width and depth for at least 100 miles where no improvement is required. The last 40 miles should have a minimum width of 600 feet and a depth of at least 25 feet at extreme low water. The Manchester Canal is 35 miles in length, must be entered through locks, and about 28 miles of the total length has a minimum width of 120 feet, while the minimum width of the entire canal is 90 feet. Yet that canal safely handles a commerce exceeding 5,000,000 tons per year.

The Suez Canal is 104 miles in length and has a bottom width varying from 108 to 118 feet for about 86 miles of its length, and yet this canal does an important business in freight of high value per ton.

The Kaiser Wilhelm Canal is 61 miles in length, has a bottom width of 72 feet and locks 492 feet long and 82 feet wide.

Hamburg is on the Elbe River 85 miles from sea, and this river has been improved from a minimum depth of about 6 feet to a minimum depth of 8 meters and a minimum width of 200 meters. The commerce on this river in seagoing vessels exceeds 20,000,000 tons per year and reaches all ports of the world. Moreover, this river was originally icebound for several months each year, but is now kept open for navigation the entire year.

The Panama Canal is being designed entirely for seagoing vessels. It is necessary to make six lockages in passing through the canal and the alignment and width are more objectionable than would obtain on the improved Hudson.

The St. Marys River safely handles a tonnage exceeding 60,000,000 tons per year for a season of eight months through a rocky channel varying from 300 to upward of 600 feet in width. The vessels navigating this channel carry larger cargoes than the average tramp steamer that may be expected to navigate the Hudson River, many of them exceeding 600 feet in length and 60 feet in beam.

Enough examples have been cited to show that it is very common now for large vessels to navigate restricted channels.

(4) A question has arisen as to whether a vessel could secure a full cargo at the upper Hudson. The internal commerce of New York and Boston at present probably exceeds 50,000,000 tons per year. A large per cent of this commerce passes through Albany. The export and import trade made up at these two cities can be more cheaply made at Albany, which is at least 200 miles nearer Chicago than either of the above-named ports.

Again, referring to the Manchester Canal, one of the early shipments reaching the city of Manchester from an American port carried the following cargo: Live stock, butter, cheese, grain, hay, wood, pulp, oat meal, eggs, lard, sugar, and manufactured articles. These are products of the forest, mine, and farm tributary to the capital district on the north and west and can all be stored and handled in large quantities at this district.

(5) It is probable that the difference in cost between the freight handled on large canal barges and in seagoing vessels is not great, but it is pointed out that a large amount of the freight that would be attracted to this district in seagoing vessels would never find shipment on canal barges, and again referring to the history of European canals it has been shown that the interior ports receive the same traffic rates that the ports at the mouth of the canal enjoy. Hence, Albany would probably receive commerce from abroad at the same rate that New York City does and the saving in rail haul would, as above stated, exceed 200 miles for shipments destined for western points.

The saving in freight rates for all commodities destined for the Capital district would be the elimination of the terminal charge at New York City, amounting to 80 cents per ton, and the rail or water rates between these points, varying from $1.80 per ton for sixth-class freight to $5.20 per ton for first-class freight. The saving on freight destined for western points would not be as great as this but would be a very material saving. It is fully believed that when business has been readjusted to the new conditions the saving in freight rates would be enough in one year to pay the entire cost of constructing a ship channel to the Capital district with a minimum depth of at least 25 feet at extreme low water.

The State of New York, the different municipalities of the Capital district, railroads and private individuals are now undertaking comprehensive improvement of harbor facilities. Albany alone, with the railroads entering that city, proposes to expend at least $6,000,000 on water front and terminal improvements. None of the improvements above mentioned can be intelligently designed and constructed until it is known what depth the Federal Government proposes to provide in the tidal Hudson, and if the improvement of the tidal Hudson is deferred to a later date great monetary losses will be suffered by the necessity of reconstructing these harbor facilities for greater depths.

It is urged by the shipping interests and admitted by representatives of your corps that the present project is not sufficient to accommodate the present commerce of the Hudson River. Hence, it will be necessary for the Federal Government to at once undertake further deepening and widening of the channel. If this work is only made to accommodate the present craft and later it is determined to improve the channel to accommodate sea-going vessels, the Federal Government will have been put to a great extra expense in thus improving the channel piecemeal.

Summarizing this and previous reports and statistics gathered and submitted to Col. Black, the following conclusions are drawn:

(1) The Hudson River is the most important commercial river of the United States. Its tonnage is large and the value of freight per ton greatly exceeds that of any carried on rivers of large tonnage.

(2) The present project is not sufficient to care for the present commerce.

(3) The railroads paralleling the Hudson are taxed to their utmost to handle the freight now offered them.

(4) The completion of the New York State barge canals will add enormously to the commerce carried on the Hudson and make further improvement imperative.

(5) The Hudson is practically an estuary for more than 100 miles of its length, affording a channel unrestricted in width and depth.

(6) The Hudson now handles an important freight and passenger business, the latter at a speed of 20 miles per hour, the largest vessels designed to carry 5,500 passengers.

(7) The Hudson can be improved as far north as Troy so as to make it safe for sea-going vessels and the commerce both local and inland, waiting for such vessels, is extensive and attractive, the inland commerce from the ports of Boston and New York now reaching probably 50,000,000 tons per year.

(8) The Capital district is an important railroad center and railroad division point with roads reaching to all parts of New England States, eastern Canada and the Middle West.

(9) The Capital district is at the junction of the Erie and Champlain Canals and at tide water and is the natural transfer point between canal and sea-going vessels.

(10) The topographic conditions along the banks of the Hudson at the Capital district are such as to afford excellent docks and harbors, slips, railroad yards, and other terminal and transfer facilities.

(11) No other point between Albany and New York possesses these advantages, or ever will possess the advantages cited in the 8th, 9th and 10th conclusions above.

(12) Comprehensive terminal facilities are being undertaken by the State, municipalities, railroads, and individuals at the Capital district. These projects can not be

intelligently designed until it is known what depth of water will be afforded in the tidal Hudson, and if designed for present depth great monetary losses will be suffered in reconstructing for some greater depth.

(13) The cost of improving the tidal Hudson to accommodate sea-going vessels is a nominal one compared with enormous resulting advantages to the country at large.

(14) If the improvement is to be made to accommodate sea-going vessels, the saving in freight rates on local and inland commerce on freight handled and regulated as a result of the improvement will in one year pay for the entire cost of the project.

If you desire further information or statistics regarding this project, we will be glad to be heard before your Board either in writing or oral arguments. In any event, we want to most respectfully but earnestly protest against the confirmation of the report of Col. Black and the postponement of this important project to some future date.

Very respectfully submitted.

M. G. Barnes,
Consulting Engineer.

Board of Engineers for Rivers and Harbors,
Southern Building, Washington, D. C.

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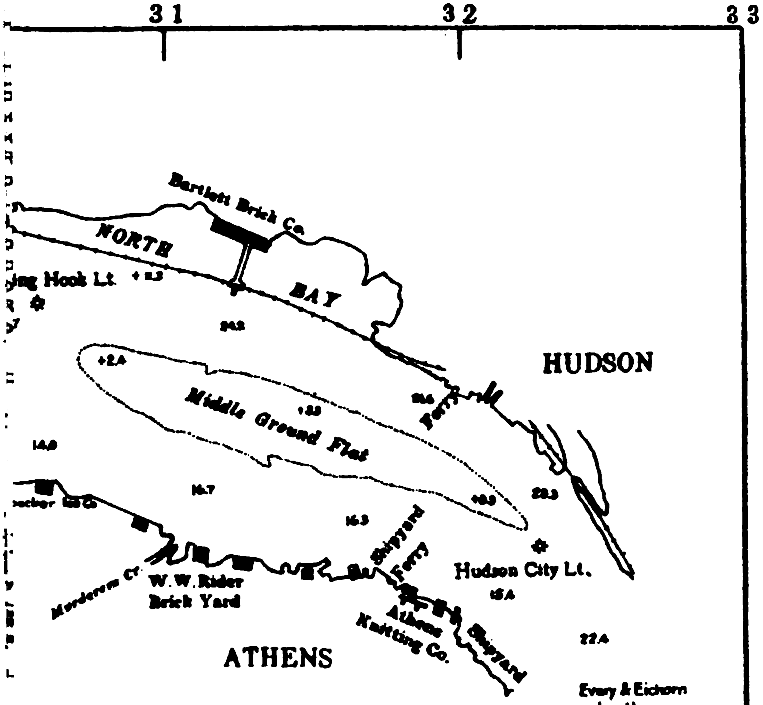

DSON RIVER

NEW YORK

ATERFORD TO HUDSON

.TO ACCOMPANY REPORT OF
FEB. 27, 1912

SCALE
5000 10000 FT.

ATES ENGINEER OFFICE, DISTRICT NO. 1, NEW YORK
ROOM 710 ARMY BUILDING
NEW YORK, N. Y. ...... FEBRUARY 27, 1912
FULLY FORWARDED TO THE CHIEF OF ENGINEERS
ORT OF THIS DATE

W. M. Black
COLONEL, CORPS OF ENGINEERS U. S. ARMY

3 1 3 2 3 3

House Doc. No. : 62d Cong., 3d Sess.

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1161.

DALLES-CELILO CANAL, OREG. AND WASH.

LETTER

FROM

THE SECRETARY OF WAR.

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON SAVING TO BE EFFECTED BY RAPID PROSECUTION OF WORK ON DALLES-CELILO CANAL, OREG. AND WASH.

DECEMBER 12, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, December 11, 1912.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 10th instant, together with copy of a report from Capt. Henry H. Robert, Corps of Engineers, dated November 1, 1912, on saving to be effected by rapid prosecution of work on Dalles-Celilo Canal, Oreg. and Wash., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 10, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Saving to be effected by rapid prosecution of work on Dalles-Celilo Canal, Oregon and Washington.

There is submitted herewith, for transmission to Congress, report dated November 1, 1912, by Capt. Henry H. Robert, Corp of Engineers, in response to the following provision in section 1 of the river and harbor act approved July 25, 1912:

> Improving Columbia River between the foot of the Dalles Rapids and the head of Celilo Falls, Oregon and Washington: * * *. And the Secretary of War shall submit a report whether any saving can be effected, and if so, how much, by a more rapid prosecution of this improvement.

W. H. Bixby,
Chief of Engineers, U. S. Army.

SAVING TO BE EFFECTED BY RAPID PROSECUTION OF WORK ON DALLES-CELILO CANAL, OREG. AND WASH.

United States Engineer Office,
Portland, Oreg., November 1, 1912.

From: Captain H. H. Robert.
To: The Chief of Engineers.
Subject: Saving to be effected by rapid prosecution of work on Dalles-Celilo Canal.

1. The following report is submitted in compliance with letter of September 13, 1912, office of the Chief of Engineers, pursuant to provision of item in river and harbor act approved July 25, 1912, as follows:

> Improving Columbia River between the foot of the Dalles Rapids and head of Celilo Falls, Oregon and Washington: Continuing improvement, seven hundred thousand dollars, and the Secretary of War shall submit a report whether any saving can be effected, and if so, how much, by a more rapid prosecution of this improvement.

2. The following is extract from river and harbor act of June 25, 1910:

> Improving Columbia River, between the foot of the Dalles Rapids and the head of Celilo Falls, Oregon and Washington: Continuing improvement with a view to completing said improvement within a period of six years, six hundred thousand dollars.

3. Appropriations for this project to date have been made as follows:

Appropriated prior to adoption of present project (see House Doc. 421, 57th Cong., 2d sess.)	$350,000
Mar. 3, 1905	50,000
June 30, 1906	250,000
Mar. 2, 1907	100,000
May 27, 1908	336,000
Mar. 4, 1909	164,000
June 25, 1910	600,000
Feb. 27, 1911	600,000
July 25, 1912	700,000
Total	3,150,000

4. The amount (estimated) required to be appropriated for completion of the existing project, as shown in the last annual report from this office to the Chief of Engineers, is $2,508,392.64, since which the appropriation of $700,000, of July 25, 1912 has been made, leaving $1,808,392.64 as the amount now required to be appropriated for completion of the existing project on the basis of the above-mentioned estimate.

5. The delay incurred since January 1, 1912, as compared with what would have been the rate of progress had ample funds been available,

is estimated as at least six months, there having been of course a necessary reservation made of a portion of the then available funds to provide for the possibility of no funds becoming available by the last river and harbor act. This delay was made up of reduction of force and partial suspension of work for several months, total suspension of work for about two months, together with additional delays incident to delivery of materials, collection of force, etc., necessarily incurred in starting the work again.

6. The time mentioned for completion in second paragraph of this report—that is, six years from June 25, 1910, would be June 25, 1916—that is, three years and eight months from the present time. After careful consideration of present conditions, it is believed that in view of the above-mentioned delay already incurred the canal can not be completed to best advantage before January 1, 1915, even with ample funds available for said work. The canal can, however, with funds available, be completed by that date, which is two years and two months from the present time and one year and six months in advance of June 25, 1916, the time originally proposed in the river and harbor act of June 25, 1910.

7. The saving therefore to be considered is that based on completion with ample funds available and by approximately December 31, 1914, as compared with completion with appropriations about as follows:

March, 1913	$600,000.00
June, 1914	600,000.00
March, 1915, such lesser amount as may be necessary for completion of canal (on basis of estimate for project)	608,392.64

With appropriations made available as above indicated it is probable that the canal could be completed by December 31, 1915, and little, if any, earlier. To have ample funds available for most advantageous prosecution of the work would now require appropriations as follows:

March, 1913	$1,200,000.00
June, 1914, such lesser amount as may be necessary for completion of canal (on basis of estimate for project)	608,392.64

In view of possibility of delay in appropriating the latter amount necessary for the completion and to obtain the best possible results from same it would be even better to increase the 1913 appropriation to $1,400,000 with a view to completion of the project without further appropriations even though this $200,000 in excess of the $1,200,000 would probably not necessarily be used before June, 1914. As already stated this condition of ample funds available would admit of completion of the canal by December 31, 1914.

8. Comparison of the times of completion considered possible under the two conditions of appropriation stated in paragraph 7—that is, December 31, 1914, and December 31, 1915—reduces the actual difference in construction time to one year, and any estimate of saving in actual cost of work will be based accordingly.

9. It is estimated that the saving that can be effected by adoption of the more vigorous method of prosecution of the work is as follows:

(*a*) Saving in general superintendence, $11,000.

The work is of such a nature, involving blasting of large quantities of rock, rock excavation by steam shovel, rock excavation by derricks, sand and gravel excavation by steam shovels, sand excavation by teams, crushing of rock and sand for concrete, and mixing and placing of concrete, and is so spread out over a length of about 8½ miles as to absolutely necessitate the services of two superintendents of construction and two assistant superintendents, even should the work be prosecuted only at rate necessary to complete it in 1916. This superintendence force, however, can take care of the work if prosecuted at the increased rate proposed. The saving above reported for general superintendence represents the salaries of this force for one year, together with a proportion considered just of Capt. Robert's salary, as that officer, though having immediate local charge of the work and living at the site thereof, has additional duties in connection with other work in the district that requires a portion of his time.

(*b*) Saving in engineering, $7,200.

Work of the nature and location involved in this project necessitates the maintenance of a competent survey party of five men, four of whom are continuously in the field and one generally in the office. Their work of laying out and checking the work must be done as it progresses, whether at the lesser or greater rate considered in this report. In addition to this force there is absolutely requisite the services of a competent designing draftsman in connection with the design of lock gates and other structural metal work, as well as incidental designs, required in the prosecution of the work. The saving above-mentioned is made up of the salaries of the above-named employees for one year.

(*c*) Saving in cement testing, $1,800.

The maintenance of a cement-testing laboratory is both essential and desirable, information being obtained that is of both local and general value. The maintenance of this laboratory, which must be practically continuous to get the value of series tests, costs about $150 per month. Cement must be tested before using, and sufficiently to insure its satisfactory quality. The number of samples tested does not necessarily increase in direct ratio with the quantity of cement used, being influenced by judgment and local conditions. With no more than the present laboratory expense, cement could be tested at sufficient rate to admit of earlier completion of the canal, yet the laboratory is essential so long as any cement is being used. The saving above mentioned is made up of the cost of maintenance and operation of field cement-testing laboratory for one year.

(*d*) Saving in hospital operation, $3,000.

Local conditions, coupled with the hazardous nature of some of the work involved in the project under consideration, necessitate the maintenance of a field hospital with services of a competent surgeon. Our present arrangement, while no more than requisite for prosecution of the work at the slower rate considered herein, is ample for the care of more vigorous prosecution. The saving mentioned above is the estimated cost of maintenance and operation of our field hospital for one year.

(*e*) Saving in office and storekeeping expense, $12,000.

The checking of receipts and expenditures of supplies, the requisitioning of same, and the large expenditures for hired labor involved in this project, even if prosecuted with a view to completion at the later date considered, necessitate the services of a competent force of clerks, storekeepers, and timekeepers. To increase the rate of progress of the work would simply increase the duties of this force without any considerable increase in the expense thereof. The saving above mentioned is the estimated cost of the necessary force of this kind for one year.

(*f*) Saving in district office expense, $6,000.

The relation of the district headquarters office to this work is such that with the work progressing at the lesser rate considered there will be for such time as the work so proceeds an amount of about $600 per month of the expenses of that office chargeable thereto. An increase in the rate of progress of the work would not increase this just charge by more than $100 per month. The above-mentioned saving is computed for one year at the rate of $500 per month.

(*g*) Saving in mess house and camp maintenance expense, $6,000.

The conduct of the work involved in the project under consideration involves the operation of a subsistence department and the maintenance of two mess houses located about 5 miles apart and capable of feeding from 200 to 400 men each, and the maintenance of two complete construction camps. The cost of this does not increase directly with the number of men cared for. The unit cost per man for subsistence (board and lodging) decreases as the number cared for increases. The saving that can be effected along this line by the earlier completion of the canal is estimated as at least $500 per month or $6,000 for the entire year thus involved.

(*h*) Saving in control of shifting sand dunes, $5,000.

The canal basin for several thousand feet of its length is overlaid or flanked by dunes of drift sand, utterly worthless so far as any value to the construction work is concerned, and a constant menace to excavated portions of the canal. These dunes drift with the wind, the extent and direction of their motion being dependent on this element, but during the course of a year is, in some cases, surprisingly large. For such portions of this sand as are not to be removed from a dangerous vicinity of the canal, the treatment adopted is to break down the dunes and cover them with rock from canal excavation. So that to a large extent these two operations of caring for this annoying sand and excavating rock from the canal prism must go hand in hand. This, combined with the fact that a supply of water in the canal will facilitate the supply of water to vegetation where growth of same can be used to advantage in controlling sand movement, makes it obvious that the earlier the canal is completed the less will be the expense incurred by the natural movement of this drift sand. No definite statement can be made of the value along this line of one year's earlier completion of the canal, but it is estimated at not less than $5,000.

(*i*) Saving in excavation of deposits by river freshets, $5,000.

During the freshet seasons of the Columbia River certain excavated portions of the canal prism are filled with water from the river, which finds its way thereto either over low places in the banks of the uncompleted canal or by percolation through the yet unlined embankments in the sand and gravel sections. In one section of unfinished excavation, about 1¼ miles long in sand and gravel, two such freshets left a deposit of 40,000 to 50,000 cubic yards of sand, which will have to be removed before the placing of lining in same. In an unfinished rock section of the canal where the rock on the river side was low, conditions were such as to have left by a single freshet a deposit of about 15,000 cubic yards of sand in a single short section of the canal excavation. Each succeeding freshet is confronted by new conditions along the canal as the construction work progresses, and this fact, together with the considerable range in height of the freshets from year to year, renders indeterminate the amount of saving along the line described in this paragraph that can be effected by an earlier completion of the canal, but it is believed that $5,000 is a conservative estimate for the case in question.

(*j*) Saving in protection of unfinished work and plant from river freshets, $2,500.

As the freshet seasons of the Columbia River approach, portable plant, such as steam shovels and their equipment, that are working in localities liable to flooding, are either transferred to other work at higher elevations or are moved to places of safety and laid up for a short time. For fixed plant, the location of which is established by necessary conditions of its operation, subjects it to exposure to freshets, special precautions must be taken to protect it. Similarly special precautions must be taken to protect unfinished work that would otherwise be liable to damage by freshets. Both the moving to and from its place of work of heavy plant, such as steam shovels, and the other precautions mentioned which take the nature of temporary dams, special enrockment for embankments, etc., involve additional expense for each season, and it is considered a conservative estimate to place the saving on this account for one year's earlier completion of the canal at $2,500.

(*k*) Saving in purchase of supplies in large quantities under most favorable market conditions, $10,000.

The making of appropriations as suggested herein with a view to the completion of the work at the earlier date mentioned will enable the placing of contracts for all the large supplies, such as metal work (lock gates, etc.), cement, coal, reenforcing steel, etc., necessary to complete the work, without so far reducing the balance available for the other necessities of the work, such as pay roll and other supplies, as to interfere with the best progress of the work. The value of supplies that could be thus covered by contracts let for entire remaining amounts would not be less than $500,000. Portions of each class of such supplies will be needed at such times as to render necessary the purchase of at least some of each from the next appropriation, no matter what its amount. To have sufficient funds available to contract for the entire amounts necessary to complete the canal, of all supplies of the character mentioned that can be advantageously so purchased, and to be in condition to take advantage of most favorable market, will, it is believed, effect a saving of not less than 2 per cent on the amount mentioned, or a saving of $10,000 at least.

(*l*) Saving in actual salvage value of plant, $5,000.

The severe sand storms to which a large portion of the canal line is subjected from time to time, and the continual blowing of the sand for several months each year, works considerable hardship on plant operating in such location. The fine sand finds its way into all crevices and plays havoc with wearing surfaces. This condition, in connection with that of the normal depreciation of plant with age, makes $5,000 a conservative estimate, it is believed, of the saving in actual salvage value of the plant on the project in question by completion of the work one year sooner.

(*m*) Saving to this and other appropriations in the district by earlier release of plant well adapted for other prospective work now authorized, $10,000.

There is a large amount of plant on The Dalles-Celilo canal work that, if available for such transfer, would be quite useful in connection with other work soon to be undertaken in this district. For instance, locomotives, rail, derricks, and hoisting engines for jetty work; cars, wagons, teams, and scrapers for road work, involving also possible demand for light locomotives, track, small steam shovel and probable demand for rock-crushing plant, all of which could soon be supplied, and hoisting engines and derrick fittings for small dredging plants or for snag boats. It is estimated that the release of plant that will be accomplished by one year's earlier completion of the canal will, if taken advantage of in connection with present or prospective work in the district, effect a saving to the General Government of at least $10,000 as compared with the value of such release if made a year later.

10. Probable saving on labor.

Although the labor market for work in this immediate vicinity is not as good as it was a year ago, and we have to pay more for labor than we were paying at the time of our enforced suspension of work hereinbefore mentioned, still it is thought that the probable future changes in the condition of the labor market in this part of the country will be such as to make it in the interest of economy to terminate our large dependence on same as soon as practicable, i. e., to complete the work at the earlier date considered herein. This matter is so indefinite, however, that no attempt is made to estimate the amount of saving by one year's earlier completion of the canal, but it is believed that some saving can be so effected.

11. The above savings for which figures are given are summarized below.

(*a*) Saving in general superintendence	$11,000
(*b*) Saving in engineering	7,200
(*c*) Saving in cement testing	1,800
(*d*) Saving in local hospital	3,000
(*e*) Saving in local office and storehouse force	12,000
(*f*) Saving in district office expenses	6,000
(*g*) Saving in mess house and camp maintenance expense	6,000
(*h*) Saving in control of shifting sand dunes	5,000
(*i*) Saving in excavation of deposits by river freshets	5,000
(*j*) Saving in protection of unfinished work and plant from river freshets	2,500
(*k*) Saving in purchase of supplies in large quantities under most favorable market quotations	10,000
(*l*) Saving in actual salvage value of plant	5,000
(*m*) Saving to this and other appropriations in the district by earlier release of plant well adapted for other prospective work now authorized	10,000
Total	84,500

12. This total for the items comprised therein is believed to be conservative, and this fact, together with probable saving in labor mentioned in paragraph 10, and the added economy of having sufficient funds available to work continuously, as far as local physical conditions admit, each piece of plant on the project (except the necessary reserve) to its normal capacity as long as it is needed, will, it is believed, bring the total saving to be effected well over $100,000.

13. It is therefore believed that $100,000 is a proper minimum estimate for the saving that can be effected by having appropriations made as indicated in paragraph 7 of this report with a view to the earlier completion of the canal.

HENRY H. ROBERT,
Captain, Corps of Engineers.

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1167.

EASTERN BRANCH OF ELIZABETH RIVER, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF EASTERN BRANCH OF ELIZABETH RIVER, VA., FROM NORFOLK & WESTERN RAILWAY BRIDGE TO BROAD CREEK.

DECEMBER 13, 1912.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, December 12, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 9th instant, together with copy of a report from Maj. E. E. Winslow, Corps of Engineers, dated October 15, 1912, on preliminary examination of Eastern Branch of Elizabeth River, Va., from Norfolk & Western Railway bridge to Broad Creek, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 9, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Eastern Branch of Elizabeth River, Va.

1. There is submitted herewith, for transmission to Congress, report dated October 15, 1912, by Maj. E. Eveleth Winslow, Corps of Engineers, on preliminary examination of Eastern Branch of Elizabeth River, Va., from Norfolk & Western Railway bridge to Broad Creek, called for by the river and harbor act approved July 25, 1912.

2. The improvement of the Eastern Branch of Elizabeth River is included in the project for improvement of Norfolk Harbor, under which a channel 500 feet wide and 25 feet deep has been provided in this branch as far up as the Norfolk & Western Railway bridge, and 500 feet wide and 22 feet deep thence to the Campostella bridge. Soundings made by direction of the district officer show a present channel depth of more than 16 feet and 200 feet wide for the lower half and 100 feet wide for the upper half of the distance from the latter bridge to above the Virginian Bridge, beyond which there is an available channel 10 feet deep and over 200 feet wide to a point opposite the mouth of Broad Creek.

3. The inner harbor of Norfolk under improvement by the United States has a total available wharf length of 21 miles. Of this total length less than one-half has as yet been developed and a considerable portion of that already developed is not utilized to its full capacity.

4. With reference to the need for increased navigation facilities in the Eastern Branch, the district officer presents a detailed study of the situation showing that the present facilities are utilized only to a very limited extent. Above the Campostella Bridge there has been as yet practically no commercial development. Under these circumstances, the district officer concludes that there is at present no business demand for an increase in the channel depth of this part of the harbor, and he is of opinion that it is not advisable at this time to make any change in the project for improvement of the Eastern Branch. The division engineer concurs in this opinion.

5. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated November 25, 1912, concurring with the views of the district officer and division engineer.

6. After due consideration of the above-mentioned reports, I concur with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Eastern Branch of Elizabeth River, Va., from Norfolk & Western Railway bridge to Broad Creek, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, November 25, 1912.

To the Chief of Engineers, United States Army:

1. Under the project now in force for the improvement of Norfolk Harbor there is to be provided a channel 35 feet deep and 500 feet wide through a shoal between Norfolk and the ocean; a channel 35 feet deep and 400 feet wide from deep water in Hampton Roads up the Elizabeth River to the intersection of the Eastern and Southern Branches and up the Southern Branch to the Belt Line Bridge, just beyond the navy yard. Under various revisions of the general

project, the following minor channels have been provided: A channel 200 feet wide and 20 feet deep up to near the West Norfolk Bridge in the Western Branch; a channel 300 feet wide and 25 feet deep for 1½ miles above the Belt Line Bridge, and 200 feet wide and 22 feet deep for a further distance of 2½ miles up to the Norfolk & Western Bridge in the Southern Branch; a channel 500 feet wide and 25 feet deep as far up as the Norfolk & Western Railway Bridge, and 500 feet wide and 22 feet deep from said bridge up to Campostella Bridge in the Eastern Branch.

2. The present investigation refers to the Eastern Branch from the Norfolk & Western Railway Bridge to Broad Creek. As already stated, this branch has been improved between the Norfolk & Western Railroad Bridge and Campostella Bridge, but no improvement has been made by the United States between Campostella Bridge and Broad Creek, although harbor lines have been laid down over this reach.

3. The commerce of Norfolk Harbor as a whole is very large, amounting to nearly fourteen and one-half million tons, but it is not practicable to determine what portion of this pertains to the reach now under consideration. It is, however, a very small part and and there is practically none on the unimproved section.

4. The district officer has made a careful and comprehensive study of the physical conditions at this harbor with reference to the existing wharves, the space occupied by them, and the unimproved or still available sites. It appears that of the total length of shore line, less than one-half has as yet received any commercial development, and there is a considerable portion of that which has been improved that is only partially developed. His investigations show that within the past 5 years there has been but very little additional frontage developed, the great commercial increase that has taken place being due to the greater utilization of existing wharves. At the present rate of progress it will be several decades before the total frontage available for wharf purposes has been brought into use.

5. Referring to the Eastern Branch, it appears that nearly all of the Berkley shore below the Norfolk & Western Bridge, where there has been an improved channel 25 feet in depth for a number of years, is still undeveloped, and only about one-half the front is utilized on the reach between the Norfolk & Western and Campostella Bridges, although there has been an available channel on this portion 22 feet deep for the past five years. The district officer calls attention to the fact that while a few years ago it appeared that there would be an extensive development on the reach under consideration, this has not taken place, and in fact the importance of the Eastern Branch seems to have decreased in some respects.

6. After careful study the district officer states that his investigations have led him to the belief that there is no genuine business need of improvement of Norfolk Harbor that can not be well provided for without an increase in the scope of the improvement of the Eastern Branch. He therefore reports that, in his opinion, it is not advisable at this time to make any change in the project for the work on this reach, either by increasing the channel dimensions in the part already improved or by extending the project to cover the part where no work has yet been done. The division engineer states that the effect of the

improvement would be almost entirely local and that it is not worthy to be undertaken entirely by the United States.

7. Interested parties were advised of the unfavorable tenor of the district officer's report and given an opportunity of presenting their views to the board, but no communications on this subject have been received.

8. It appears from the conditions described by the district officer that while there is a large and valuable commerce at this port, the space available for wharfage development adjacent to the sections of river already improved has not been utilized or developed to its full extent, and there is yet available a large extent of harbor frontage which should be brought into use before any extension of the river projects would be justified. Particularly is this true of the Eastern Branch, where, although commodious channel dimensions have existed for a number of years, there has been but little shore development. In view of all the facts the board concurs with the district officer and the division engineer and reports that, in its opinion, it is not advisable at the present time for the United States to undertake any additional improvement of the Eastern Branch of Elizabeth River, Va., from the Norfolk & Western Railway bridge to Broad Creek.

9. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF EASTERN BRANCH OF ELIZABETH RIVER, VA.

War Department,
United States Engineer Office,
Norfolk, Va., October 15, 1912.

From: The district engineer officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Preliminary examination of Eastern Branch of Elizabeth River, Va.

1. The river and harbor act approved July 25, 1912, provides for an examination of the Eastern Branch of Elizabeth River, Va., from Norfolk & Western Railway bridge to Broad Creek. This part of the Eastern Branch of the Elizabeth River forms part of the harbor at Norfolk, Va., the Norfolk Harbor harbor lines established in 1890 extending on both sides of the river throughout the portion of the Eastern Branch specified in the act. A part of this length, namely, from the Norfolk & Western Railway bridge to the Campostella bridge is included in the part of Norfolk Harbor under improvement by the United States, but the remainder of the length, that is, from the Campostella bridge up to Broad Creek, though protected by harbor lines, has never been improved. The provision for the examination

calls, therefore, for a reexamination, with reference to increased channel dimensions, of a portion of Norfolk Harbor now under improvement, and an examination as to the advisability of extending the improvement over a part of the harbor where no work has as yet been done.

2. The city of Norfolk is located on the Elizabeth River about 10 miles from the mouth of this river in Hampton Roads, and about 30 miles, by water, from the mouth of Chesapeake Bay at Cape Henry. In a commercial sense, the term "Norfolk" includes not only the city of that name, but, in addition, a number of other neighboring and clearly grouped cities and towns, all situated upon the different branches of the Elizabeth River and separated from one another by the branches of that river and its tributary creeks. The total population of this group of municipalities is estimated at 125,000.

3. The location is shown on the Norfolk quadrangle of the Geological Survey maps, Coast Survey Chart No. 400, and the inclosed tracings, one of the inner harbor proper and all its branches, and the other of the portion of the Eastern Branch mentioned in the act.

4. Norfolk is the eastern or northeastern terminus of six large railroad systems radiating to the south and west, namely, the Norfolk Southern, Seaboard Air Line, Atlantic Coast Line, Southern, Norfolk & Western, and the Virginian. In addition, by means of a car transfer to Cape Charles City, Va., on the other side of Chesapeake Bay, there is a rail connection northward with the Pennsylvania Railroad system, and by a similar transfer across Hampton Roads to Newport News, connection is made with the northwest by the Chesapeake & Ohio system.

5. Norfolk is the southern terminus of a large number of steamboat lines, giving connection to northern cities, such as Washington, Baltimore, Philadelphia, New York, Providence, and Boston, and there is, in addition, a large amount of coastwise freight shipped to northern ports in sailing vessels or barges. As yet Norfolk is not the terminus of any regularly established trans-Atlantic line, though it is a frequent port of call for foreign vessels coming in to obtain bunker coal.

6. In addition Norfolk is the terminus of a large number of local steamboat lines, running to towns and landings on the various rivers and creeks in southeastern Virginia and northeastern North Carolina. Much freight, in addition, is brought to Norfolk in schooners and power boats from the localities just mentioned.

7. Norfolk lies at the north end of an important section of the proposed intracoastal waterway, namely, the section from Norfolk to Beaufort. This part of the waterway is now, and has been for many years, actually open to commerce and is available for vessels of about 9 feet draft. Connection with this waterway is through the southern branch of the harbor.

8. There results from the above-described conditions a large and steadily growing movement of commerce through the waters pertaining to Norfolk Harbor. This commerce amounted to less than 2,000,000 tons in 1888, to about 5,000,000 tons in 1900; 12,000,000 in 1910, and during the calendar year 1911 it is shown by the commercial statement in the annual report for 1912 to have amounted to 14,445,112 tons. A copy[1] of this statement is inclosed.

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[1] Not printed.

9. The total just stated does not include the freight carried by ships coming to Norfolk for bunker coal, or such of the freight of the waterways to the southward as goes through and does not stop in Norfolk, though both classes of commerce actually pass through Norfork Harbor. The total given, however, exceeds the commerce of Baltimore and is much greater than the commerce of any of the other South Atlantic or the Gulf ports, and is exceeded in the ocean ports of the United States by the cities of New York, Philadelphia, and Boston alone. It is believed that such an amount of commerce is sufficient to justify the United States in making in Norfolk Harbor all the improvements that its business may properly require.

10. An analysis of the commercial statement referred to above indicates that the larger part of the commerce of Norfolk Harbor consists of the transfer through the harbor of freight received from one direction and destined for another. Only a small part consists of articles manufactured on the shores of the harbor. It is believed, however, that the amount of this character of freight will increase in the future.

11. As is shown on the tracing submitted, the terminals of the different railroads and steamboat lines on the shores of Norfolk Harbor are widely scattered, and when necessary freight is transported from one to another, either by barges and car floats or by the steamboats themselves proceeding from terminal to terminal until loaded. Such a method is neither efficient nor economical, but the scattering of the railroad termini has the advantage of giving railroad connection at many different points, and thus furnishing practically the entire wharf front of Norfolk with convenient railroad service.

12. Practically all the docks and wharves pertaining to Norfolk Harbor are privately owned or controlled, but the question of providing suitable public docks is now under consideration by a commission appointed through the agency of the city of Norfolk. There is ample space for such docks, but on land not now the property of the city. The only terminal facilities at Norfolk which can be considered as thoroughly adequate and up to date and which are well fitted with mechanical appliances for freight handling are the large coal piers of the Norfolk & Western and the Virginian Railways. At a few of the other docks mechanical appliances are used to a limited extent, but most of the docks are neither modern nor well arranged, the handling of freight being done entirely by hand and hand trucks.

13. The larger part of the freight transferred between rail and water at Norfolk is handled on through bills of lading. Indeed, one of the principal obstacles to the development of a trans-Atlantic trade from Norfolk is the extremely close relation existing between certain railroad and boat lines. In several cases a railroad having a terminus in Norfolk is controlled by the same interests as a steamboat line to a northern city, and it has been alleged that this close relation between railroad and boat line has resulted in discrimination to the detriment of a trans-Atlantic trade direct from Norfolk.

14. On account of the widely scattered terminals of the different railways and boat lines and the movement, either on steamers or by barges or floats, of freight from one terminus to another in the different parts of Norfolk Harbor it is impossible to classify the total commerce of Norfolk according to the particular branch of the harbor to which it pertains, and consequently no separate commercial statement can be given for the Eastern Branch.

15. The area drained by the Elizabeth River, as is clearly shown on the Geological Survey map, is quite low, and a considerable portion of it is swampy. Consequently there is but little sediment brought into the river, and the maintenance of the different parts of the inner harbor of Norfolk is not especially expensive.

16. The level of the water being due entirely to tidal influence, no questions of water power for industrial or commercial purposes are involved in the improvement of the harbor. Freshets do not occur, and the banks are overflowed, to a limited extent, only in case of extraordinarily high tides backed up by storm winds.

17. Prior to 1877 there was available in Norfolk Harbor a channel 20 feet in depth up the main river and the Southern Branch to the Norfolk Navy Yard. At the mouth of the Eastern Branch there was a shoal having over it a depth of 15 feet, which limited the depth which could be carried into the Eastern Branch, although above this shoal the water was deeper. Norfolk Harbor is tidal, the average range of the tides being about 2.5 feet.

18. The original project for the improvement of Norfolk Harbor was adopted in 1878; but this project has been many times extended and revised, the last revision having been adopted by Congress June 25, 1910.

19. Under this project, as finally revised, there is to be provided for Norfolk Harbor a channel 35 feet deep and 500 feet wide through a shoal lying between Norfolk Harbor and the ocean and located near Thimble Shoal Lighthouse, in the southern part of Chesapeake Bay; a channel 35 feet deep and 400 feet wide from deep water in Hampton Roads up the Elizabeth River proper to the intersection of the Eastern and Southern Branches and up the Southern Branch to the Belt Line bridge, just beyond the navy yard. (Under earlier projects the channel in the main part of the Elizabeth River was dredged to widths of 600 and 800 feet, but for lesser depths than 35 feet.)

20. By the act of February 27, 1911, the improvement of Norfolk Harbor was put under the continuing-contract system, and work under this system is now in progress. All the work authorized will probably be completed before the end of the present fiscal year, though the total amount authorized by the act of February 27, 1911, has not yet been appropriated. It should be noted, further, that, though by the act of June 25, 1910, Congress definitely adopted a certain project for the improvement of Norfolk Harbor, it has not yet authorized the expenditure of the total estimate called for by this project.

21. Under the various revisions of the project for Norfolk Harbor, the following minor channels of 20, 22, or 25 feet depths have been provided in the different branches of the harbor: In the Western Branch, a channel 200 feet wide and 20 feet deep up to near the West Norfolk Bridge; in the Southern Branch, a channel 300 feet wide and 25 feet deep for 1½ miles above the Belt Line Bridge and a channel 200 feet wide and 22 feet deep for the further distance of 2½ miles up to the Norfolk & Western Bridge; in the Eastern Branch, a channel 500 feet wide and 25 feet deep as far as the Norfolk & Western Railway Bridge and a channel 500 feet wide and 22 feet deep from the Norfolk & Western Bridge up to the Campostella Bridge.

22. Work on all these branch channels was completed sometime ago, and by maintenance work from time to time the project depths and widths are believed to have been kept available.

23. The Norfolk & Western Railway Bridge crosses the Eastern Branch of Norfolk Harbor a little more than a mile above the junction of the Eastern and Southern Branches. This bridge has a lift draw with an opening 140 feet in the clear. The portion of the Eastern Branch below this bridge has had in it for the last five years at least a channel 25 feet deep and 500 feet wide. It is now and has been for many years unimpeded by bridges, but recently there has been an apparent public demand for an additional bridge connecting Norfolk and Berkley, and in July of this year the Secretary of War granted to the city of Norfolk permission to build such a bridge one-third of a mile below the Norfolk & Western Bridge, the bridge to have a lift draw providing an opening 140 feet in the clear.

24. The next bridge above the Norfolk & Western Bridge is the Campostella Bridge, located a little more than a half a mile farther up the stream. The channel maintained in this part of the river between these two bridges has been 22 feet deep and 500 feet wide.

25. The Campostella Bridge is an old toll bridge that has been in existence for many years. It contains a swinging draw giving a clear opening of 37½ feet.

26. Above the Campostella Bridge the river has not been improved by the United States, though harbor lines were in 1890 established as far up as Broad Creek, a distance of 2¼ miles. Within this distance and about 1¼ miles above the Campostella Bridge the river is crossed by still another bridge, that of the Virginian Railway, having a swinging draw providing two clear openings of 60 feet each.

27. The Eastern Branch through its entire length from the intersection of the Southern Branch up to Broad Creek is nearly straight, the bends being few and gentle. The established pierhead lines are about 680 feet apart at the Norfolk & Western Bridge, 700 feet near the Campostella Bridge, 570 feet near the Virginian Bridge, and 550 feet just below Broad Creek.

28. Above the Campostella Bridge there are a few points where the banks come out to near the harbor line and end in bluffs some 6 or 8 feet high, but between these bluffs there is a tendency of the banks to recede into bights of considerable size where the water is usually very shallow and the banks marshy. Many of the more salient points also are fringed with grassy flats.

29. From the character of the stream, its depth and width, its proximity to the other part of Norfolk Harbor, and its railroad connections, the upper part of the Eastern Branch has great commercial potentialities, especially in providing factory sites. It is not probable that this portion of the harbor will ever be used as terminals for the interchange of land and water traffic. In fact, the harbor of Norfolk would be better off at present if there were fewer of these terminals and those that existed were more efficient.

30. The last complete survey of this part of the river was made as long ago as 1890, and it was therefore considered necessary in connection with this preliminary examination to take soundings above the Campostella Bridge in order to give data as to the depths now existing. These soundings show that there is at present an available channel more than 16 feet deep from the Campostella Bridge to above the Virginian Bridge. The channel of this depth is more than 200 feet wide for the lower half of this length and not less than 100 feet wide in the upper part. From a short distance above the Virginian

Bridge to a point opposite the mouth of Broad Creek there is an available channel 10 feet deep and over 200 feet wide.

31. The soundings recently made, though not numerous enough to be used as a basis for an accurate estimate of cost, are yet sufficient to show that the excavation of a channel of the depth and width provided for the other branch channels of the harbor would be quite expensive.

32. The drainage area of the Eastern Branch is very low and the soil is not clayey, and in consequence but little sediment is brought into or is deposited in the river. A comparison of these recent soundings with those made 22 years ago would indicate that between pierhead lines and above the Campostella Bridge there has been an average deposit of about 2½ feet, not sufficient to indicate any extreme difficulty in the maintenance of an improved channel, but quite enough to show that it is not advisable to dredge such a channel until there is a real business demand for it.

33. As an aid in determining whether there is an apparent immediate demand for the further development of the Eastern Branch, I have had made and inclose a map of the inner harbor at Norfolk, including the main river as far seaward as Lamberts Point, and the eastern, southern, and western branches of the harbor. From this map it would appear that in the inner harbor of Norfolk, or rather the portions of this harbor under improvement by the United States, there is a total available wharf length of over 21 miles. Of this total length less than half has as yet received any commercial development, and there is a considerable portion of that already developed which has been developed to a limited extent only, and there are occasional instances where wharf property once developed has been abandoned and has been allowed to fall into decay.

34. An attempt has been made, by investigation of the dates of the various wharves, to determine at what rate the harbor front is being taken up for actual development. The result has been to show that within the last five years very little additional frontage has been developed, the large increase that has taken place in the commerce of the harbor during this period being due to the greater utilization of the existing wharves and not to the development of new ones. If only the same rate of progress in the development of the wharf front is maintained in the future as during the last five years, it will be several decades yet before the total available wharf front in the improved part of Norfolk Harbor is entirely brought into use.

35. Taking into consideration the Eastern Branch alone, it will be noted that nearly all of the Berkley shore below the Norfolk & Western Bridge is still undeveloped. This portion of the Eastern Branch is now, and has been for years, unimpeded by bridges. The available channel depth is 25 feet, as great as can be expected to be provided in any of the branch channels of Norfolk Harbor.

36. Between the Norfolk & Western and Campostella Bridges also (access to which is now impeded by but one bridge, the Norfolk & Western, with a 140-foot opening) only about half the actual wharf front is utilized, though there has been for at least five years an available channel depth of not less than 22 feet.

37. The dredged channel in this part of the Eastern Branch is 500 feet wide and extends on both sides of the river to within less than 100 feet of the established pierhead lines, which are here from 680 to 700 feet apart.

38. In the dredging of channels in Norfolk Harbor, it has been the custom, as in many other harbors of the United States, not to dredge all the way to the pierhead lines, but to leave a space outside of the pierhead lines from 75 to 100 feet wide. It has been considered that the space immediately in front of the piers, at least for a distance equal to the width of a vessel, and a little more pertained rather to the pier itself than to general commerce, and that when the United States has gone to the expense of dredging a deep channel to within such a short distance of the wharf front, it is only fair to expect that the owner of the wharf will dredge out the short remaining distance. Furthermore, by doing no dredging within 75 or 100 feet of a wharf all questions of undermining, damage, or injury to the wharf are avoided.

39. As has been stated, the United States has dredged in the Eastern Branch between the Norfolk & Western and Campostella Bridges a channel 22 feet deep, and in connection with this preliminary examination soundings have been made between this dredged channel and existing wharves, and these soundings have shown that with the exception of the shipyard of Smith & McCoy there is no place in this section of the river where the wharf owners have dredged out to the channel lines to a depth exceeding about 15 or 16 feet at low water.

40. At the shipyard of Smith & McCoy there has been installed a floating dry dock. In order to enable this dry dock to sink enough to be entered, the area under it has been dredged to a depth of about 30 feet, while between the dry dock and the channel line deep dredging also has been done. However, the bottom of the dry dock is so thick and so much space is required for the keel blocks that the dry dock can not at mean low water be entered by vessels drawing more than 15 feet.

41. Above the Campostella Bridge there has been as yet no commercial development whatever, except that immediately above this bridge there are located the ends of the Standard Oil Co.'s pipes, communicating with the company's oil tanks a considerable distance back on the shore. Such development as has taken place in this section has been in the way of laying out residential property and the construction of dwellings thereon.

42. The lack of commercial development of this portion of the stream may be to some extent due to the somewhat inadequate draw span of the Campostella Bridge, but there is no record in this office of any formal attempt having been made to cause the company operating this bridge to widen its draw, a matter within the jurisdiction of the Secretary of War and not requiring a report to Congress.

43. Some six or seven years ago, during a previous tour of duty in this city, I was in charge of the improvement of Norfolk Harbor, and at that time there were indications of a probable early and rapid development of the Eastern Branch. The Norfolk & Western Railway had found it necessary to consider replacing their single-track bridge across the Eastern Branch by a double-track bridge, and the commercial needs of the Eastern Branch appeared so urgent that the railroad was permitted to double track its bridge only upon condition that there be substituted for the old swinging drawbridge, having an opening of 52 feet, a new lift draw with a span 140 feet wide. At about the same time there was a project on foot to build an aerial

ferry bridge across the Eastern Branch about a third of a mile below the Norfolk & Western bridge, and the commercial importance of the Eastern Branch at that time seemed so great that a permit for this aerial ferry bridge was granted only upon condition that the abutments of the bridge should be practically coincident with the pierhead lines, which requirement made the cost of the bridge so great that the bridge has never been built.

44. A comparison of the present wharf conditions in the improved part of the branch with the conditions existing at the period mentioned, some six or seven years ago, shows that practically no advancement has been made. It was then understood that there would be an immediate utilization of nearly all of the Berkley shore westward of the Norfolk & Western bridge and that several enterprises were about to locate between the Campostella and the Norfolk & Western bridges. Nothing of the kind has taken place, and such new enterprises as have been established in the last few years have been located mainly along the Southern Branch, and along those portions of the Southern Branch where the depths are not greater and where the conditions as to width and the number of bridges to be passed through are more unfavorable than at the still unutilized sites on the portion of the Eastern Branch under improvement.

45. In fact, the importance of the Eastern Branch has in one respect decreased. Some seven years ago the Norfolk & Western Railway dredged in front of its wharves a short distance downstream from its bridge to a greater depth than then existed at the mouth of the Eastern Branch, this being done with the idea of using these wharves for the transfer of freight from cars to large vessels. The business has since been transferred to the railroad's warehouse docks contiguous to the Lamberts Point coal piers.

46. In connection with this matter, my predecessor in this office, Lieut. Col. Patrick, under date of April 26, 1912, in submitting a report upon the proposed new drawbridge across the Eastern Branch, and in discussing the action of the department on the question of the aerial ferry bridge some years before, stated:

> During the period since 1905, although there has been an ample depth of water and an ample width of channel in the Eastern Branch, the expected commercial development along this stream has not taken place. In fact, since 1905 there have been but three new plants located along the Eastern Branch; one is the power house of the street railway company, built in 1906 and 1907. Although this plant is located on the river and is prepared to obtain coal by water, but little coal comes to it afloat; and in a letter from this company, which will be found in the appendixes,[1] it is stated that the proposed bridge will in nowise interfere with this enterprise. The Standard Oil Co. has established the terminus of its pipe line above the Campostella Bridge, but in a letter, also appended, this company likewise says that the bridge will cause it no inconvenience. The third plant located on this stream since 1905 is that of J. H. Cofer & Co. (Inc.), which handles hay and grain. (This is located below the Norfolk & Western bridge and on the site of an old dock.) In a letter hereto appended it is stated that the bridge will be no detriment, provided the draw is not less than 140 feet wide, and that there is provided a clear height of about 35 feet above the water level. It is evident that in the seven years since 1905 the commercial development along the banks of this stream has been quite inconsiderable.

47. Immediately after it became generally known that Congress had directed an examination of the Eastern Branch, considerable interest was manifested in the community, and a number of articles advocating this improvement appeared in the local newspapers.

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[1] Not printed.

48. Sixteen letters were received at this office from persons interested in the improvement, and, in addition, a set of resolutions was passed by the board of trade and business men's association. A bound collection of letters and arguments has been prepared by the Norfolk Harbor Improvement Association. All of these papers[1] are forwarded with this report.

49. Most of the letters received were of a general character only, expressing an interest in the proposed improvement and giving as the principal argument in its favor the expected large increase in the business of Norfolk Harbor due to the opening of the Panama Canal. In one or two it is implied that Norfolk Harbor has been developed to such an extent that manufacturing sites, especially those combining rail and water facilities, are becoming quite scarce, most of the available water front having been taken up.

50. The idea that sites for development as wharf or manufacturing property are becoming scarce is shown by the map submitted to be quite erroneous. From this map it appears clearly that there still remain approximately 11 miles of unused frontage on the portions of the harbor already improved by the United States. Some of these sites not yet utilized are on the deepest channel, some are on the minor channels; some on wide stretches of rivers, some on narrow; some front on the Elizabeth River proper, and some on each of its branches.

51. That such an extent of unused property should already have been taken up can be true only if the words "taken up" are used in a special sense, to indicate that the property has passed into the hands of persons who are holding it either with an idea of eventually developing it themselves or in expectation that its value will increase.

52. Some of the letters received show ignorance of existing conditions as to other matters. Thus it is implied in one letter that no work has been done in the Eastern Branch, while the other branches have been developed; and, in another, it is stated that "the available depth in the Eastern Branch is only about 12 feet, whereas it is 20 feet in the Southern Branch." The facts are that the channels in the Eastern Branch have been dredged to a greater depth than in the Western Branch, and to the same depths and greater widths than in the Southern Branch.

53. The principal appeal for the proposed improvement consists of the bound volume[1] of papers furnished by the Norfolk Harbor Improvement Association. In this volume there are statements as to the value of the property along the river, with a list of the owners thereof; a statement as to the length of the part of the river between the Norfolk & Western Bridge and Broad Creek already utilized, that which has been "taken up for actual early improvement," and that not yet developed and with no plans for development. Also a statement that the tonnage of the vessels which ply over this part of the branch is about 800,000. This is vessel tonnage, and not freight carried. Most of the vessels are small, but make frequent trips on this part of the river.

54. In this volume, there are also a number of letters, divided into three classes: Those from individuals now operating industries on the Eastern Branch; those from individuals who have ideas of improving their property at an early date; and, third, those from

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[1] Not printed.

persons not owning property on the Eastern Branch, but who merely express an interest in the improvement. As to this latter class of letters, it is not necessary to make any remarks, as they are of the same character as the general letters referred to above.

55. Of the other two classes of letters, some of them are from persons owning property between the Norfolk & Western and Campostella Bridges, where a channel has already been provided by the United States, and others from persons owning property above the Campostella Bridge, where improvement is requested. The letters will be considered as divided in this way.

56. One of the letters advocating improvement between the Norfolk & Western and Campostella Bridges is from the Virginia Railway & Power Co., who constructed a power plant some five or six years ago just above the Norfolk & Western Bridge. They state that they located their power house on the Eastern Branch so that they might have water facilities, and thus get competitive rates on the coal which they use—that is, so that they might, in case of necessity, have their coal brought to them in barges. About the time this plant was constructed some dredging was done by this company, but to a depth of about 7 feet only. Not very long ago they dredged a narrow trench, about 20 feet wide by 14 feet deep, for the purpose of giving a free flow of water for use in their condensers. Though their plant has been in operation for about five years, they have made no attempt to provide wharf or dock facilities, or to make a connection between their plant and the 22-foot channel dredged by the United States, which depth of channel it is believed will provide all the facilities needed by them when they desire to use it.

57. Another letter is from the Virginia Fiber Corporation, which owns a factory on the Berkley side of the river. A factory at this site has been in existence for many years, but there is at present no wharf, other than a small dock available for rowboats only. This company states that they have contemplated putting a pier out to the port warden line, but that as the channel is so narrow it would compel them to go halfway across the river. By a conversation with the manager of this company it is learned that by this they mean that their factory is so far back from the channel line that the expense of constructing a dock would be considerable, and that they have not felt justified in going to this expense.

58. Two letters are included from the Colonna Marine Railway Corporation and the Marine Iron Works, doing business as a marine railway near the Norfolk & Western Railway Bridge. The piers pertaining to these corporations do not extend out to the pierhead line. In front of these piers and railways a small amount of dredging has been done, but the depth thus provided is less than 15 feet.

59. Another letter has been received from Joseph M. Clark & Co. In this letter they claim that they have "docked and dredged out 500 feet," at an expense of over $100,000. This company owns two wharves extending to the port warden line, and a small wharf, for small boats, of lesser length; but the dredging which has been done along these wharves would, from an examination, appear to have been carried to a depth not exceeding 16 or 17 feet. This same company owns some property on the Berkley side of the river, but this as yet is entirely undeveloped.

60. Another letter is from Hudson & Bro., who own property on the Norfolk side of the river, about halfway between the Norfolk &

Western and Campostella Bridges. They claim to have improved their property by building a wharf and extending same to the port warden line, and to have dredged out their dock so as to accommodate vessels from 200 to 250 feet in length. They also claim to be negotiating with a company, and to have given them an option on this property for the purpose of building a factory. The dock of this company is not at present in good condition, and the water along either side of it is impeded by sunken hulks. Between the end of the wharf and the edge of the channel the available depth of water is less than 15 feet.

61. Immediately below the Campostella Bridge, on both sides of the river, are located two dredging companies—Sanford & Brooks on the Norfolk side and the Norfolk Dredging Co. on the Berkley side. Both companies have built small wharves for the use of tugs and have dredged from their wharves to the Government channel, but the depths provided to the wharves have been less than 15 feet.

62. Another letter is from Smith & McCoy. This enterprising firm has done considerable work to develop their property, have built several wharves, and have provided themselves with a floating dry dock. As noted in a previous part of this report, they have done considerable dredging along their property and between it and the channel line, and they are the only individuals or corporations on this part of the river who have made a real attempt to render actually available the depth of water already provided by the Government. However, as stated in the former part of this report, their dry dock is at present not available at low water for vessels drawing over 15 or 16 feet, and it is believed that the existing depth of 22 feet is as much as their business requires at present.

63. The facts, then, with regard to the section of the Eastern Branch between the Norfolk & Western and the Campostella bridges may be briefly summed up as follows: Some five years ago the United States improved this section of the river, providing a channel 22 feet deep and extending to within less than 100 feet of the established pier-head lines, on both sides of the river. In spite of the existence of this channel almost no additional wharf front has within this period been brought into use, about one-half of the property still remaining undeveloped and not utilized. Even where the property fronting on the improved channel is now in use, but a single firm has attempted to improve the front of their property, so as to render available at a wharf the full depth of water provided by the United States, the others having done no work at all or being contented with depths 5 or 6 feet less than that provided by the United States. These facts would seem to indicate that not only is there at present no business demand for an increase in the channel depth of this part of the harbor, but rather that the depth that has been provided was given somewhat prematurely.

64. Above the Campostella bridge, as has been stated in other parts of this report, no work has been done by the United States, and there has been almost no commercial development, though there now exists up as far as to above the Virginian Bridge a channel, narrow it is true, but still a practicable channel, 16 feet deep, as great a depth as any but one of the riparian owners between the Norfolk & Western and Campostella bridges has, up to the present time, found it necessary to actually prepare his wharves to utilize.

65. On the north side, immediately above the Campostella bridge, the Standard Oil Co. has driven some pile clusters and has provided the terminals of the pipe lines through which oil is pumped to their tanks situated much farther inland. The barges in which the oil is received are of light draft, and it is believed that there is now sufficient depth for them. No letter seems to have been received from this company.

66. On the south side of the river, immediately above the Campostella bridge, the property is owned by Mr. O. F. Smith, head of the Norfolk Dredging Co., which controls the wharf front immediately downstream from this same bridge. Mr. Smith is at present engaged in bulkheading and filling a portion of his property above the bridge and in connection with this work has dredged a narrow cut to allow the scows of dredged material to be brought in, the material used for filling behind the bulkheading being that dredged in private work in various parts of the harbor. Whether or not the property thus reclaimed is intended for residence or business purposes is not apparent.

67. In a few other places along the upper part of the Eastern Branch bulkheads have been built. In some places they are merely revetments to prevent the caving of the banks, but in others these bulkheads have been constructed across bights and have been afterwards filled in. This improvement has generally been followed by the laying out of streets and the construction of residences.

68. On the upstream side of the Virginian Railway and north of its bridge the Virginia Steel Corporation has constructed a steel plant. This is located several hundred feet from the river bank, but it appears from the letter of the company that it owns to the shore. The letter states that the company has not as yet built a dock or developed its water-front property, but that the improvement of this branch would enable scrap iron to be brought in and possibly the finished product to be shipped. In choosing this location for their plant this corporation apparently had in mind rail transportation only, for the factory was built a mile and a quarter above the end of the channel then and now under improvement by the United States. Should this company have real need of water transportation, there is now a channel up to opposite their plant 16 feet deep, sufficient for quite large-sized barges.

69. One letter comes from the Southgate Packing Co., who state that they own 2,000 feet water-front property on this river at Woodbine, Va., and expect to make a development and erect a packing plant. This locality is above Broad Creek, where the depth of the river is less than below this creek; consequently an improvement extending to Broad Creek would be of no avail to this company unless it be extended farther up.

70. Practically all of the other letters received from the landowners along the creek, and whose property is still undeveloped commercially, are of an extremely general character, stating that the property was purchased with a view to commercial or manufacturing purposes but giving no definite idea as to the extent of the improvement or when this improvement will take place.

71. That the shores of the Eastern Branch possess important commercial potentialities and that all the property fronting on this branch will be eventually utilized for business purposes is probable, but, com-

pared with other parts of the harbor, commerce to and from the upper part of this branch will always be considerably hampered by the number of bridges to be passed through.

72. That the owners of the land along this part of the river should desire its improvement is but natural, and that they have plans more or less definite for its commercial development is also to be expected, but comparisons of existing depths with those found by former surveys have shown clearly that it is not advisable that the expense of dredging a deep channel in this part of the harbor should be undertaken until the business of the harbor actually requires it, and that it is now required is not clear to me. Indeed, it is hard to see how there can be any real commercial needs of Norfolk Harbor requiring, among other things the further extension of the improvement of this branch, that would not have come distinctly into evidence and have shown themselves in the recent past by a more rapid utilization than has actually taken place in the harbor front as a whole, and especially in the lower part of the Eastern Branch, and that would not have caused riparian owners between the Norfolk & Western and Campostella bridges to utilize to the full the channel depth provided by the United States in that part of the harbor.

73. So great has been the apparent pressure behind this proposed extension of the improvement of the Eastern Branch that it has appeared necessary to go into the subject very fully. I have made several inspections of this branch and of the other parts of Norfolk Harbor. I have examined the wharves and terminals and sounded around them. I have looked up maps and records and have had many consultations with the persons interested in the improvement, and I am sorry to have to report that the more I have investigated the more I have been convinced that there is no genuine business need of Norfolk Harbor that can not be well provided for without an increase at this time in the scope of the work of the Eastern Branch. Were the United States in the near future to increase the channel facilities of this branch, some business development might follow, but it is believed that this would result in no material benefit to the harbor as a whole and that the profits would accrue almost solely to the land owners along the upper part of the Eastern Branch.

74. Indeed it would appear not improbable that the result of doing further work in the Eastern Branch might even be to the detriment of the harbor as a whole, for the main channel of the harbor has not as yet received all the attention which its large and growing commerce demands. Though Congress has formally adopted a somewhat comprehensive project, the full amount of the estimated cost of this project has not yet been authorized. Furthermore, the width of the deep-water channel covered by this last project is only 400 feet, much narrower than the channels previously provided under former projects for lesser depths. There are frequent congestions in the available anchorage, and consequently it is extremely probable that before long the growing commerce of the port and the increased use of the main channel by naval vessels, which are growing larger every year, will require further extensions of the general project. It would therefore appear unwise at this time to divert congressional attention from the needs of the main channel, whose improvement is for the good of the port as a whole, to one of the minor branches of the harbor, for the improvement of which there is no apparent present demand.

75. After careful consideration of all the features of the case, I am constrained to the opinion that it is not advisable at this time to make any change in the project for the work in the Eastern Branch, either in increasing the channel dimensions in the part already improved or in extending the project to cover parts where no work has as yet been done.

E. EVELETH WINSLOW,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., October 25, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

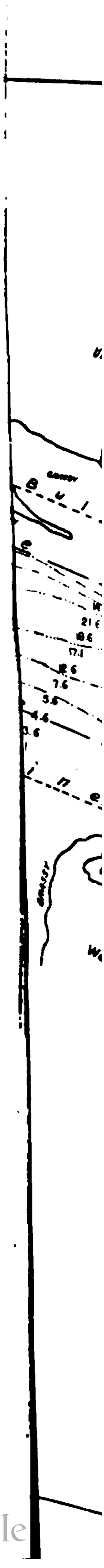
1. It is evident that the improvement of the Eastern Branch of the Elizabeth River can have no bearing upon the successful maintenance of the improvements which have been made elsewhere in the harbor of Norfolk, and, from the showing of the district officer in this report, it is evident that this improvement is not imperatively demanded at this time by the interests of commerce.

2. The effect of the improvement would be almost entirely local and would result in the increased value of the riparian lands or, in other words, in the improvement of real estate. The general public is not greatly interested in this and the United States has no way to get back the money spent in making improvements of this character. The improvement is local. If it is paid for by the actual owners of the land, they get back their expenditure in the increased value of their property. If it is paid for by the city or county, as the case may be, the cost can be recovered from the increased objects of taxation. Therefore I am of the opinion that if this improvement is made at this time it should be paid for by the local interests or, at least, they should contribute very largely toward the cost of it.

3. I agree with the district officer that it is not worthy to be undertaken entirely by the United States at present.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]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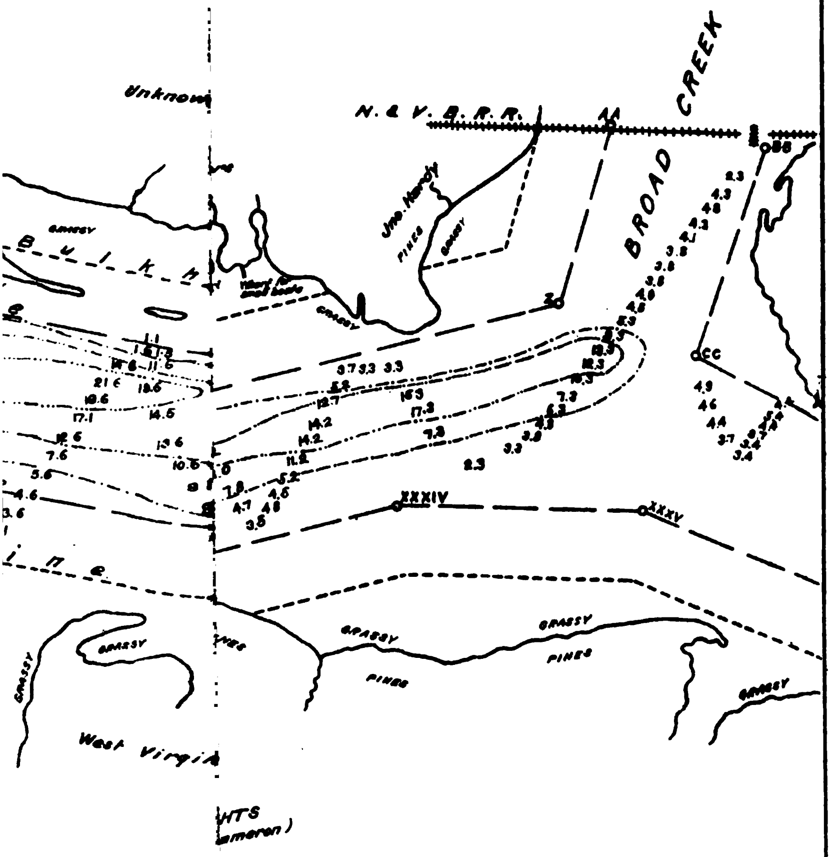

PART OF

EASTERN BRANCH,

ELIZABETH RIVER,

VIRGINIA.

September 12, 1912.

SCALE OF FEET

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W.R.J. 10/8/12.

62D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1190.

YORK SPIT CHANNEL, BALTIMORE HARBOR, MD.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF BALTIMORE HARBOR, MD., AT YORK SPIT, CHESAPEAKE BAY.

JANUARY 2, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, December 30, 1912.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copies of reports from Lieut. Col. Lansing H. Beach, Corps of Engineers, dated November 22 and December 18, 1912, with map, on preliminary examination and survey, respectively, of Baltimore Harbor, Md., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 30, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Baltimore Harbor, Md., and York Spit, Chesapeake Bay.

1. There are submitted herewith, for transmission to Congress, reports dated November 22 and December 18, 1912, with map, by Lieut. Col. Lansing H. Beach, Corps of Engineers, on preliminary examination and survey, respectively, of Baltimore Harbor, Md., with a view to securing greater width in the channel of approach at York Spit, Chesapeake Bay, called for by the river and harbor act of July 25, 1912.

2. York Spit Channel is located in the lower end of Chesapeake Bay, nearly opposite the mouth of York River. It has been improved

by the United States under the project for improvement of the channel to Baltimore, which provides for a depth of 35 feet at mean low water and a bottom width of 600 feet, from Fort McHenry to deep water in Chesapeake Bay and through the shoals opposite York Spit in the lower end of the bay. The adopted width of 600 feet has proven ample in the comparatively protected waters of the upper bay, but it appears that, owing to the exposed location of the York Spit Channel, the width at this point has not been found sufficient for safe navigation by vessels of large displacement under all conditions of weather, and it is stated by the district officer that the pilots' association has declined to bring the larger vessels coming to Baltimore through the channel at night. Navigation interests desire that the channel be widened to at least 1,000 feet, and after full investigation of the subject, the district officer believes that it is advisable for the United States to increase the width of the channel at this point to 1,000 feet. The division engineer concurs in this opinion, and he believes that the project should allow for 1 foot overdepth in dredging, the estimate for which, as given by the district officer, is $305,250, and $20,000 annually for maintenance.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 23, 1912, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Baltimore Harbor, Md., with a view to securing greater width in the channel of approach at York Spit, Chesapeake Bay, is deemed advisable so far as to secure an available width of 1,000 feet, at an estimated cost of $305,250 for first construction and $20,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

To the Chief of Engineers, United States Army:

1. The existing project for improvement of the channel to Baltimore Harbor provides for a depth of 35 feet at mean low water and a bottom width of 600 feet from Fort McHenry to deep water in Chesapeake Bay and through the shoals opposite York Spit in the lower end of the bay. The adopted width of 600 feet has proven ample in the comparatively protected waters of the upper bay, but it has been found that, owing to the exposed location of the York Spit Channel, which is open to the sweep of the winds from the Atlantic Ocean, and the further complications of conflicting currents, pilots

and shipowners hesitate to use this section on account of the contracted width and the danger of grounding and damaging their vessels. The district officer states that the Pilots' Association has declined to bring the larger vessels coming to Baltimore through this channel at night, and are averse to doing so in the daytime under unfavorable weather conditions. As a consequence, it appears that an average of three or four vessels of large displacement are each week thus detained overnight, occasioning considerable delay and hardship.

2. Navigation interests desire that the channel be widened to at least 1,000 feet, and from his investigation the district officer expresses the opinion that the York Spit section of the channel leading to Baltimore is worthy of further improvement to the extent of increasing the width to 1,000 feet. Estimates for such widening are given as follows:

Allowing no overdepth	$206, 250
Allowing for 1 foot overdepth	305, 250
Allowing for 2 feet overdepth	412, 500

It is believed that the yearly maintenance would not exceed $20,000. The division engineer concurs in the views of the district officer regarding the advisability of the proposed widening, and expresses the opinion that the work should allow for 1 foot overdepth, the estimate for which amounts to $305,250.

3. After consideration of the facts presented, the board has reached the conclusion that the widening of the York Spit section of the channel to Baltimore to the extent proposed by the district officer is essential to the safe and expeditious navigation of the larger vessels plying to Baltimore, and it therefore expresses the opinion that it is advisable for the United States to undertake the improvement under the plan allowing for 1 foot overdepth, at a first cost of $305,250, and a subsequent expenditure for maintenance amounting to $20,000 per annum. The full amount of the estimate should be provided in one appropriation.

4. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF BALTIMORE HARBOR, MD., AT YORK SPIT, CHESAPEAKE BAY.

United States Engineer Office,
Baltimore, Md., November 22, 1912.

From: Lieut. Col. Lansing H. Beach, Corps of Engineers.
To: The Chief of Engineers, United States Army (Through the Division Engineer).
Subject: Preliminary examination of York Spit Channel.

1. In compliance with Department letter of August 5, 1912, the following report on the preliminary examination of Baltimore Harbor, Md., with a view to securing greater width in the channel of

approach at York Spit, Chesapeake Bay, as provided for in the river and harbor act of July 25, 1912, is submitted.

2. A description of previous projects for the Patapsco River and channel leading to Baltimore, Md., is given on pages 297 and 1405 of Annual Report of the Chief of Engineers for 1911. The York Spit Channel is a section of this work, and is located in the lower end of Chesapeake Bay, nearly opposite the mouth of the York River, with its northerly end about 8⅛ miles due east of York Spit Lighthouse, from which point it extends about south one-half west 4½ miles, the southerly end being 8 miles west by north one-half north of Cape Charles.

3. No work was done by the General Government at this locality in connection with a project for a channel to Baltimore Harbor prior to March 3, 1905, the date of adoption of the present project for a channel 35 feet deep by 600 feet. It then became necessary to dredge a channel in this part of the bay owing to the controlling depth of about 31 feet which existed near the mouth of York River.

4. At the time of the adoption of this project it was thought that a uniform project width of 600 feet would be sufficient. This has been ample in the comparatively protected waters of the upper bay, but it has been found that owing to the exposed location of the York Spit Channel, open to the sweep of the winds from the Atlantic Ocean and the further complications of conflicting currents, pilots and shipowners hesitate to use this section on account of the contracted width and the danger of grounding and damaging their vessels if for any reason, as in passing a sailing vessel or other ship, it should become necessary to stop the propeller and thereby leave the vessel unduly subject to the adverse influences mentioned above in a channel only slightly wider than the length of the ship.

5. On account of this danger the pilots' association has declined to bring the larger vessels coming to Baltimore through this channel at night, and are averse to doing so in the daytime under certain weather conditions. It is stated that an average of three or four vessels of large displacement are each week thus detained over night, not being able to proceed to Baltimore until the next morning. This is a source of considerable delay to the largest and most expensive vessels plying to the port, and a hardship to its commercial interests.

6. This channel is also used by the ships of the Navy in coming up the bay to the firing grounds near Tangier Sound, and to the Naval Acadamy at Annapolis.

7. No separate commercial statistics are obtainable for this detached part of the project channel to Baltimore. Commercial statistics for that port for 1911 are:

IMPORTS.

Free	$13,837,735
Dutiable	14,544,845
Total	28,382,580
In American vessels:	
Sailing	34,134
Steam	219,315
In foreign vessels:	
Sailing	162,894
Steam	27,957,474
In cars overland	8,763
Total	28,382,580

DOMESTIC EXPORTS.

In American vessels: Sailing	$110, 577
In foreign vessels:	
Sailing	135, 374
Steam	94, 219, 855
Total	94, 465, 806

PRINCIPAL ARTICLES EXPORTED.

Articles.	Short tons.	Articles.	Short tons.
Animal feed	86, 117	Lard	27, 182
Bacon and hams	653	Neutral oil and oleo oil	11, 476
Beef, canned	25	Oats	41
Beef, corned and salted	151	Oils, illuminating	15, 263
Binder twine	9, 903	Oils, lubricating	27, 504
Casings, sausage	1, 095	Oils, cottonseed	1, 074
Cattle	[1] 7, 150	Oilcake and meal	45, 739
Copper	106, 572	Paraffin wax	6, 346
Coal	533, 621	Pork, canned, fresh, and pickled	172
Coke	108, 285	Rosin	4, 235
Cotton, raw	38, 702	Starch	8, 735
Corn	315, 881	Steel rails	70, 328
Flour	98, 235	Tallow	2, 682
Glucose and grape sugar	4, 691	Timber and manufactures	[1] 112, 528
Iron and steel and manufactures, except rails and machinery	[1] 100, 741	Tobacco, leaf and stems	40, 737
		Wheat	161, 482

[1] Estimates.

Amount of duties collected	$4, 116, 003. 44
Miscellaneous customs receipts	149, 022. 05
Total receipts	4, 265, 025. 49
Duties on merchandise remaining in bond	98, 366. 49

SUMMARY OF DUTIES COLLECTED.

Imports and miscellaneous customs receipts	4, 265, 025. 49
Duties on merchandise remaining in bond	98, 366. 49
Merchandise transported with appraisement	8, 861. 92
Total	4, 372, 253. 90

STATISTICAL RECAPITULATION.

Value of commerce: Coal, coke, grain, iron, oysters, lumber, etc	200, 908, 059. 00
Dutiable imports have decreased	3, 022, 151. 00
Free imports have decreased	972, 749. 00
Domestic exports have increased	20, 398, 400. 00
Tonnage, foreign and coastwise, has increased (short tons)	316, 934. 00
Duties collected have decreased	623, 863. 82
Duties on merchandise in bond have decreased	14, 613. 06
Duties on merchandise in bond, with and without appraisement, have decreased	676, 436. 06

Tonnage movement, year ended Dec. 31, 1911.

	Vessels.	Short tons.
Foreign trade:		
Entered	597	1, 206, 165
Cleared	638	1, 380, 039
Coastwise:		
Entered	1, 664	2, 895, 408
Cleared	1, 968	3, 080, 198
Total	4, 867	8, 561, 810

In addition to the above-stated tonnage, an aggregate of 1,561,545 tons of freight was carried to and from Baltimore to points on Chesapeake Bay and its tributaries, consisting of agricultural products and implements, building materials, crushed stone, canned goods, coal, corn and wheat, fresh fish, general merchandise, lumber, oysters, poultry, live stock, etc.

Vessels built.

Class.	Number.	Tons.	Value.
Steam	22	18,448	$2,287,200
Sail	5	2,651	66,650
Barges	8	4,169	515,000
Yachts	3	203	77,000
Total	38	25,471	2,945,850

Foreign passengers, 19,720.

8. Owing to the natural difficulty of navigating this channel, and obstruction to its passage by the tows and vessels of the New York, Philadelphia & Norfolk Railroad, it became advisable to establish regulations for its use. These were established by the Secretary of War, under date of February 15, 1912, and are as follows:

> That the use of the 35 feet deep by 600 feet wide channel dredged by the United States opposite York Spit light in the lower Chesapeake Bay which is marked by gas buoys Nos. 2, 6, 12, and 16 on the east side and gas buoys Nos. 1A, 7, 11, and 15 on the west side, be restricted to vessels or other water craft passing up or down the bay. That it shall be unlawful for any vessel or other water craft to cross the said channel; or to enter it at any other point than at the ends and in the direction of its axis, after which the course of the channel must be followed for its entire length.

9. The interests desiring the further improvement of this channel ask that it be widened to at least 1,000 feet, and authorization was given to include an estimate of the cost of doing this in the Annual Report for 1911 (p. 1406, Appendix J). Because of the facts and reasons given above, I am of opinion that the York Spit section of the channel leading to Baltimore is worthy of further improvement to the extent of increasing the width to 1,000 feet.

10. This being a channel of approach, there are no terminal or transfer facilities contiguous to it; but the terminal and transfer facilities at Baltimore, the beneficiary of this improvement, are ample to handle the traffic of the port. The city owns 17 per cent of the dock space, and is now expending the balance of two loans, one of $6,000,000, and the other of $5,000,000 on dock improvements.

11. There is no question of water-power development that can be considered in connection with this improvement.

12. A map and an estimate of the cost of the improvement can be made without a survey from data now on file in this office.

13. A map of the locality, taken from a Coast Survey chart, accompanies this report.

LANSING H. BEACH.

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, November 30, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

Forwarded, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 5, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer and the division engineer in recommending a survey in order to determine the extent and advisability of the improvement.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF BALTIMORE HARBOR, MD., AT YORK SPIT, CHESAPEAKE BAY.

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., December 18, 1912.

From: Lieut. Col. Lansing H. Beach, Corps of Engineers.
To: The Chief of Engineers, United States Army (Through the Division Engineer).
Subject: Plan and estimate of cost of improvement of York Spit Channel.

1. Referring to Department letter of December 12, 1912, the following report is submitted with plan and estimate of cost of widening the channel of approach at York Spit, Chesapeake Bay, made pursuant to the requirements of the river and harbor act approved July 25, 1912.

2. An estimate is submitted for widening the present 600 feet wide by 35 feet deep at mean low water channel, 400 feet on the westerly side parallel to the axis of the present channel, thus providing a channel which at mean low water will have a minimum width of 1,000 feet and a minimum depth of 35 feet, such width and depth being considered suitable for boats of a maximum draft of 32 feet, for which the channel is designed; the cross section to be uniform for the full length of the channel, which is straight from end to end.

3. Estimates for such widening, the material being compact sand, are as follows:

Allowing no overdepth:	
750,000 cubic yards, at 25 cents	$187, 500
Engineering, superintendence, and contingencies, 10 per cent	18, 750
	206, 250
Allowing for 1 foot overdepth:	
1,110,000 cubic yards, at 25 cents	277, 500
Engineering, superintendence, and contingencies, 10 per cent	27, 750
	305, 250
Allowing for 2 feet overdepth:	
1,500,000 cubic yards, at 25 cents	375, 000
Engineering, superintendence, and contingencies, 10 per cent	37, 500
	412, 500

4. It is believed that the yearly maintenance would $20,000 for the 1,000-feet-wide channel after completi widening. The work can be done only with propelle dredges; and there would probably be some shoaling in pleted part during the work of widening, owing to the over the dredges.

5. There are no facts additional to those given in the pre examination concerning the advisability of widening the and there is no question of terminal facilities involved, nor any water-power development that can be considered in con with this improvement.

6. The total amount should be provided in one appropriati

7. From the facts given in the preliminary examination and the above estimate, I am of opinion that Baltimore Harb with a view to securing greater width in the channel of appro York Spit, Chesapeake Bay, is worthy of further improvem the General Government to the extent of widening it to 1,00

8. A map[1] showing the present depths along the channel panies this report.

LANSING H. BE

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, December 20, 191

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Forwarded.

2. Inasmuch as the work done heretofore at York Spit allow foot overdepth, it would seem, so far as this office is informed, the same ought to be allowed on this project, making the estim 1,110,000 cubic yards, at a cost of $305,250; and I concur in the vi of the district officer that the channel of approach at York S Chesapeake Bay, is worthy of improvement by the General Gove ment to the extent of widening it to 1,000 feet, with a depth of 35 f and allowing 1 foot for overdepth.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, se page 2.]

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[1] Not printed.

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THE NORM

REDONDO HARBOR, CAL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF REDONDO HARBOR, CAL.

JANUARY 2, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, December 28, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 26th instant, together with copy of a report from Lieut. Col. C. H. McKinstry, Corps of Engineers, dated October 26, 1912, on preliminary examination of Redondo Harbor, Cal., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 26, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Redondo Harbor, Cal.

1. There is submitted herewith, for transmission to Congress, report dated October 26, 1912, by Lieut. Col. C. H. McKinstry, Corps of Engineers, on preliminary examination of Redondo Harbor, Cal., called for by the river and harbor act approved July 25, 1912.

2. Redondo Harbor is situated on Santa Monica Bay, 18 miles north of Los Angeles Harbor. Several prior examinations have been made of this locality, the most recent of which was made by a special board pursuant to the requirements of the river and harbor act of June 3, 1896, the report being unfavorable to the establishment of a deep-water harbor at this point. At that time there were no deep water harbors in southern California, but since that investigation was made, the United States has deepened the San Diego entrance to 30 feet, and has expended more than $5,000,000 in the construction of a deep and capacious harbor at Los Angeles. The district officer states that the frontage in Los Angeles Harbor is not all taken up, and its capabilities for expansion are very great. This being the case, he believes that there is no necessity for the creation of a deep-water harbor near Redondo Beach only 18 miles distant, where the construction of a protecting breakwater would be very expensive, and where it appears that business is conducted with reasonable facility under existing conditions. He therefore expresses the opinion that Redondo Harbor is not worthy of improvement by the United States and in this view the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith of December 5, 1912, concurring with the views of the district officer and division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Redondo Harbor, Cal., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 5, 1912.

To the Chief of Engineers, United States Army:

1. This harbor is located about 18 miles north of Los Angeles Harbor, in Santa Monica Bay. It is protected from the south and partially from the southwest, and is exposed to the northwest. There are several commercial wharves in this harbor belonging to the Pacific Electric Railway Co., as well as a number of pleasure piers. The maximum draft of the vessels using the harbor is 23 feet, and it is stated that the average number of days per year when it is too rough for vessels to lie alongside the wharves is 26.

2. The commerce reported by the local chamber of commerce, consisting principally of lumber, oil, and general merchandise, amounts to 453,530 tons, valued at $12,843,694.

3. The improvement desired appears to be, in general terms, a protected harbor of sufficient area and depth to accommodate the largest vessels that may be expected to use the Panama Canal. Physical conditions here would require a long and expensive breakwater in deep water to provide such a harbor. Several reports have been submitted in reference to the improvement of this harbor, but all have been adverse, and after further investigation the district officer now expresses the opinion, in which the division engineer concurs, that Redondo Harbor is not worthy of improvement by the United States.

4. Interested parties were informed of the unfavorable report of the district officer and given an opportunity of submitting their views to the board. Several communications[1] have been received and given consideration.

5. After full and careful investigation, by direction of Congress under several acts, the present harbor of Los Angeles was selected as the most desirable for development as a deep-water port in this vicinity, and on this harbor there has been expended over $5,000,000, resulting in a protected outer harbor and a commodious inner harbor capable of great expansion. There appears to be no sufficient commercial necessity for the large expenditure that would be required to provide another deep-water port 18 miles distant, and therefore the board concurs with the district officer and the division engineer, and reports that, in its opinion, it is not advisable for the United States to undertake the improvement of Redondo Harbor, Cal.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board.

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF REDONDO HARBOR, CAL.

United States Engineer Office,
Los Angeles, Cal., October 26, 1912.

From: Lieut. Col. C. H. McKinstry, Corps of Engineers.
To: The Chief of Engineers, United States Army (through division engineer).
Subject: Preliminary examination, Redondo Harbor, Cal.

1. This is a report on a preliminary examination of Redondo Harbor, Cal., called for by the river and harbor act of July 25, 1912, and department letter of August 3, 1912.

2. The accompanying drawing shows the hydrography of Redondo Harbor, the location of the harbor with respect to other harbors in southern California, near-by railroad lines, etc.

3. Redondo Harbor is that part of Santa Monica Bay which lies adjacent to the city of Redondo Beach. It is 18 miles north of Los

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[1] Not printed.

Angeles Harbor, 186 miles south of Port San Luis, and 435 miles south of San Francisco. Santa Monica Bay is protected by the land from northwest to south around by the east, and is open to the west and southwest. Redondo Harbor being in the southeasterly end of the bay is protected from the south and somewhat from the southwest and is open to the northwest. The holding ground in the bay is good, and severe storms are of infrequent occurrence. The commercial wharves in Santa Monica Bay are the Southern Pacific wharf, about 2 miles west of Santa Monica (no longer used); the Standard Oil wharf, just completed at El Segundo, about 5 miles north of Redondo; and the three wharves of the Pacific Electric Railway Co. at Redondo. There are half a dozen or more pleasure piers at the beach resorts. The city of Redondo extends along the bay for a distance of 1¾ miles. No part of this frontage is owned by the city and there are no municipal wharves. The most northerly of the four piers within the city limits is that of the Pacific Light & Power Co. It carries the condensing water intake of that company's electrical plant and is not a commercial wharf. The other three belong to the Pacific Electric Railway Co. (Southern Pacific Co.). Of these the most northerly is 700 feet long and terminates in about 50 feet of water; the second is 600 feet long and terminates in about 60 feet of water; the third is 1,050 feet long and terminates in about 40 feet of water. The maximum draft of vessels using these wharves is 23 feet.

4. The Atchison, Topeka & Santa Fe Railway Co. has a line from Los Angeles to Redondo Beach, but owns no wharf at Redondo and has made no request for harbor inmprovements at that place.

5. The wharves of the Pacific Electric Railway Co. are built at the head of a deep submarine valley. The advantages of this site are that comparatively short piers reach deep water, and the breakers break close to the beach. It is stated that the average number of days per year when it is too rough for vessels to lie alongside these wharves is 26.

6. The president of the Pacific Electric Railway Co. states that these wharves "are open to all carriers alike under substantially the same conditions that prevail over the wharves at San Pedro;" that his company is "under no contract with any water carriers or connecting rail lines for the interchange of traffic on a prorate basis at Redondo Beach," but has "an arrangement for the handling of through traffic, their rates being made up on the combination of steam and water carriers' rates. Out of our local rate between Redondo Beach and Los Angeles the wharfage and handling charges are absorbed by the Pacific Electric Railway Co, which places Redondo Beach in practically the same class as Los Angeles and other Southern California seaports." The tracks of the Pacific Electric Railway Co. run out on all three wharves. The mechanical appliances for handling freight on these wharves are: On Pier No. 1, a stiff-leg derrick with electric winch; on Pier No. 2, two such derricks and winches; on Pier No. 3, three such derricks and winches.

7. The Redondo Beach Chamber of Commerce has furnished the the following commercial statistics for the harbor for the calendar year 1911:

Number of vessels using the wharves	709
Number of passengers, incoming and outgoing	47,207
Freight:	
138,506 thousand feet lumber, valued at	$2,770,133
975,073 barrels oil, valued at	1,218,841
27,671 short tons general merchandise, valued at $320 per ton	8,854,720
Total estimated value	12,843,694
Total tonnage, in short tons	453,530

8. The act directing the preliminary report does not specify the character or extent of the improvement contemplated. Accordingly an effort was made by correspondence and personal interviews with interested parties to find out what the local community thought advisable. Attention is invited to the accompanying letters.[1] On September 25 a duly advertised public hearing was held in the council chamber, Redondo Beach, at which all were invited to express their views. There were about 150 people present, among whom the following addressed the meeting: J. H. Cavanah, president of the board of trustees of Redondo Beach; O. N. Tomlinson, president of the Redondo Beach Chamber of Commerce; H. Brolaski, chairman of citizens' committee of Redondo Beach; C. H. Burnett, manager of outside operations for the Pacific Electric Railway Co.; Mr. Ed. C. Thomas, traveling passenger agent for the Pacific Electric Railway Co.; and P. H. Albright, consulting civil engineer employed by the Pacific Electric Railway Co. to make certain investigations of the fore shore at Redondo Beach with a view to the construction of a pleasure pier. The unanimous opinion of those who spoke at the hearing and of all those who have expressed any opinion is that a harbor should be provided deep enough to receive the "largest ships that can use the Panama Canal" and extensive enough to handle at least the "volume of commerce now passing through the port of Los Angeles." It is realized that on account of the topography of the shore the only way to create such a harbor at or near Redondo Beach is by the construction of a long breakwater, but it is also realized that a breakwater immediately in front of the existing piers, that is, across the submarine valley, is out of the question on account of cost. Of the sites just to the north and south of the ravine, the one to the north seems to be considered the better. What the community wants, therefore, is a breakwater constructed in deep water, 7 or 8 fathoms, west of the city of Redondo Beach. Under the shelter of this breakwater wharves would be built and the resulting harbor would resemble somewhat the present outer harbor of Los Angeles. Such a breakwater would lie partly in front of the city of Hermosa and partly in front of Redondo Beach. The city of Hermosa owns its water frontage, but Redondo Beach, as stated above, does not. Nothing has been heard from the city of Hermosa on the subject of harbor improvements. At the public hearing at Redondo Beach the people present voted to the effect that the city should raise money by a bond issue and cooperate with the United States in the improvement of the harbor. No steps have been taken to this end, however.

9. The question of constructing a breakwater in Santa Monica Bay is not a new one. Report on the preliminary examination of

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[1] Not printed.

"Santa Monica Bay, California," called for by the river and harbor act of August 2, 1882, is published in Annual Report of the Chief of Engineers for 1884, page 2209. The conclusion was that there was no public necessity requiring the construction of a harbor in Santa Monica Bay.

10. Report on the preliminary examination of "Redondo Beach Harbor," called for by the river and harbor act of September 19, 1890, is published in Annual Report of the Chief of Engineers for 1891, page 2972. The conclusion was that the harbor was not worthy of improvement by the General Government. The difficulty of building a breakwater immediately in front of Redondo Beach was referred to thus:

* * * * * * *

> Under any other conditions of hydrography than those that exist at Redondo, a breakwater could be constructed within some practicable limit of expense. When it is considered, however, that a portion of the structure must be in 9-fathom depths of water, the great expense attending any attempt to build it must render the scheme impracticable. * * *

11. Report of the board of engineer officers appointed under the river and harbor act of September 19, 1890. "to examine the Pacific Coast between Points Dume and Capistrano, with a view to determining the best location for a deep-water harbor," and to "report * * * a project for said harbor, with estimated cost of same," is published, with four drawings, in House Document No. 39, 52d Congress, 1st session. It discusses ably and in detail the hydrography of Santa Monica and San Pedro Bays, and the exposure and other characteristics of various harbor sites in these bays, and contains plans for a breakwater harbor near Santa Monica and one off San Pedro. The conclusion of the board was that the site off San Pedro was the most advantageous site between Points Dume and Capistrano. The best site in Santa Monica Bay was stated to be one opposite the space lying between Santa Monica and Ballona Lagoon. Of Redondo the board stated:

* * * * * * *

> At Redondo a submarine valley heads close to shore, the 10-fathom curve being only about 500 feet distant. Seaward of this point the valley widens and deepens rapidly, reaching a depth of 100 fathoms in 1½ miles. Excessive depth of water makes a breakwater at this point impracticable on account of cost. * * *

While the depths in the submarine valley opposite Redondo are so great as to render breakwater construction uneconomical there, a breakwater could be built in from 8 to 9 fathoms just to the south or just to the north of the ravine. The disadvantages of these sites as compared with the one near Santa Monica are that a given length of breakwater in any given depth of water would shelter a much smaller area of deep water than near Santa Monica, and that the topography of the shore near Redondo is much less favorable than at Ballona Lagoon for the development of an interior commercial and industrial port.

12. Report of the board of engineer officers appointed under the river and harbor act of July 16, 1892—

> * * * to make a careful and critical examination for a proposed deep-water harbor at San Pedro or Santa Monica Bay, and to report as to which is the more eligible location for such harbor in depth, width, and capacity to accommodate the largest ocean-going vessels and the commercial and naval necessities of the country, together with an estimate of the cost * * *

is printed with three drawings in House Document No. 41, 52d Congress, 2d session. The board reported that the—

> * * * location selected by the Board of Engineers of 1890, at the present anchorage at the westerly side of San Pedro Bay under Point Fermin, is the "more eligible location for such harbor in depth, width, and capacity to accommodate the largest ocean-going vessels and the commercial and naval necessities of the country."

The following sites in Santa Monica Bay were discussed: The one recommended by the preceding board (par. 11 above), one in front of Redondo Beach, and one in front of the site now occupied by the Southern Pacific wharf west of Santa Monica. Of these, it considered the Santa Monica-Bellona site the best. It was realized that the construction of a breakwater of ordinary type immediately in front of Redondo Beach was impracticable on account of cost and the possibility of sheltering the harbor by means of a floating breakwater was discussed. The board's conclusion on this matter is thus worded:

> * * * The board is of the opinion that it would not be advisable for the Government to undertake the costly and doubtful experiment of establishing a floating breakwater at Redondo, especially as such a shelter is not needed for the protection of life and property, but merely for the occasional convenience of navigation.

13. The report of the board appointed under the river and harbor act of June 3, 1896, to examine Port Los Angeles in Santa Monica Bay and San Pedro, and to make plans, specifications, and estimates for deep-water harbors at these two places, etc., is printed with numerous drawings and maps in Senate Document No. 18, Fifty-fifth Congress, first session. "Port Los Angeles" was interpreted to mean the site of the Southern Pacific Wharf west of Santa Monica. The board selected San Pedro as the better site for the deep-water harbor.

14. The opinion expressed and implied in several of these reports that the site off Ballona is superior to Redondo Harbor and is, indeed, the best site in Santa Monica Bay for an extensive harbor is undoubtedly sound.

15. At the time the matter of a deep-water harbor in Santa Monica Bay was under discussion there were no deep-water harbors in southern California. Since that time the San Diego entrance has been deepened to 30 feet, and work costing more than $5,000,000 has been done by the United States in Los Angeles Harbor (outer and inner). The present project for the outer harbor contemplates providing 35 feet of water over a large area between the 35-foot contour in this breakwater harbor and the wharves built and building by the city of Los Angeles and the Outer Harbor Dock and Wharf Co., and 30 feet of water in the channel from the 30-foot contour in the breakwater harbor to and including the "turning basin," a distance of nearly 3 miles. The latter work is about 70 per cent completed. Certain 20-foot channels also have been and are to be provided.

16. By no means all the frontage in Los Angeles Harbor made available by the United States work is in use, so that even the present capacity of the harbor is not taxed. Its capabilities for expansion, moreover, are very great.

17. This being the case, there is no need of creating a deep-water harbor near Redondo Beach, within 18 miles of Los Angeles Harbor, and at a place where business has been successfully carried on at unprotected piers for more than 20 years, and where a protecting

breakwater is, therefore, not a necessity and would be no more than an occasional convenience. I have to report that in my opinion Redondo Harbor is not worthy of improvement by the United States.

18. There is no question in this case of the development or utilization of water power for industrial or commercial purposes, nor of any other subject than that discussed.

C. H. McKINSTRY.

[First indorsement.]

UNITED STATES ENGINEER OFFICE, PACIFIC DIVISION,
San Francisco, Cal., October 30, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

Concurring in the views expressed by district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers, Division Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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PLYMOUTH HARBOR, MASS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF PLYMOUTH HARBOR, MASS.

JANUARY 2, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, December 30, 1912.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copies of reports from Col. Frederic V. Abbot, Corps of Engineers, dated October 10, 1910, and February 17, 1911, with map, on preliminary examination and survey, respectively, of Plymouth Harbor, Mass., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 30, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Plymouth Harbor, Mass.

1. There are submitted herewith, for transmission to Congress, reports dated October 10, 1910, and February 17, 1911, with map, by Col. Frederic V. Abbot, Corps of Engineers, on preliminary examination and survey, respectively, of Plymouth Harbor, Mass., called for by the river and harbor act approved June 25, 1910.

2. The present project for this harbor provides for a channel 9 feet deep and 150 feet wide leading to the town wharves. The improvement desired is an 18-foot channel, and estimates are submitted by

the district officer for such a channel via three routes. The route deemed preferable utilizes the natural deep pocket lying under the lee of Long Beach so far as it extends, and beyond that point consists of a dredged channel 18 feet deep and 200 feet wide up to the wharf front. The estimated cost is $167,000. The cost of a similar channel 150 feet wide is estimated at $125,000. The district officer analyzes the commerce which would make use of the proposed channel, and reaches the conclusion that either channel would be too costly when compared with the present water-borne commerce of the locality. The division engineer concurs in this opinion.

3. These reports were referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 6, 1912. The board gave a hearing on April 17, 1911, to Hon. R. O. Harris, M. C., and has since received a letter from the Board of Harbor and Land Commissioners of the State of Massachusetts, expressing the opinion that the State should cooperate with the Federal Government by defraying a portion of the cost of the improvement. This paper having been referred to the district officer, he expresses the opinion in his supplemental report of November 23, 1912, herewith, that the locality is worthy of improvement by the United States to the extent of creating a channel 18 feet deep and 200 feet wide, at a total estimated cost of $167,000, provided one-half of this cost be contributed by the State. In this opinion the division engineer and the Board of Engineers for Rivers and Harbors concur.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That on condition that the State or other local agency contribute one-half of the cost of construction, the improvement by the United States of Plymouth Harbor, Mass., is deemed advisable so far as to secure a channel depth of 18 feet and a channel width of 200 feet increased at entrances and on curves, at an estimated cost of $167,000 for first construction and approximately $5,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $83,500, being the full share of the cost of the improvement to be borne by the United States under the plan of cooperation recommended.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 6, 1912.

To the Chief of Engineers, United States Army.

1. From the report of the district officer on survey of Plymouth Harbor, it appears that through the cooperation of the town of Plymouth and the State of Massachusetts, a channel 150 feet wide and

18 feet deep has been dredged from the entrance to Plymouth Harbor to the wharves of the Plymouth Cordage Co., at a cost of about $145,000. The Plymouth Cordage Co. is located about 2 miles from the town of Plymouth in a northwesterly direction therefrom, and this channel is available only for the uses of the cordage company.

2. The existing project provides for a channel in the harbor 9 feet deep and 150 feet wide with a turning basin at the town wharves. The work now desired by the people of Plymouth is a dredged channel 18 feet deep, so that vessels of greater draft may reach the town wharves. In his study of this subject, the district officer has prepared several plans and estimates for such a channel. The route which appears best adapted for the purpose intended is shown on the map as channel No. 1, and this is the only route receiving serious consideration. With dimensions of 18 feet in depth by 200 feet in width, the estimated cost is $167,000, while with similar depth and a width of 150 feet, the estimate is $125,000. The district officer did not consider it advisable for the United States to undertake this improvement.

3. Interested parties were notified of the unfavorable report of the district officer and given an opportunity of presenting their views to the board. On April 17, 1911, Hon. R. O. Harris, M. C., appeared before the board in behalf of the improvement and presented a number of communications (not printed) from citizens of the locality bearing upon this subject. The matter has since been held under advisement to afford the interests concerned further opportunity to submit data regarding the necessity for the proposed improvement. Among other papers received by the board is a letter of August 16, 1912, from the Board of Harbor and Land Commissioners of the State of Massachusetts, in which the commission expresses the opinion that the State should cooperate with the Federal Government by defraying a portion of the cost of the improvement. This paper having been referred to the district officer, with request for supplemental estimates of cost of channels 12 and 15 feet deep, he reports adversely on providing either of these lesser depths, but expresses the opinion that the locality is worthy of improvement by the United States to the extent of creating a channel 18 feet deep, 200 feet wide, suitably widened at the bends, at a total estimated cost of $167,000, provided one-half of this cost be contributed by the State. The division engineer concurs in the views of the district officer.

4. After mature consideration of all the information now available, the board concurs with the district officer in believing that it is advisable for the United States to enlarge its project for improvement of Plymouth Harbor to the extent of creating a channel 18 feet deep and 200 feet wide, via route 1, as indicated on the accompanying tracing, at a total estimated cost of $167,000, contingent upon cooperation by the State of Massachusetts or other interests to the extent of defraying one-half of the cost of the improvement. The estimate for maintenance of a channel 150 feet wide is given as $5,000 and it is believed that approximately that amount will serve for the channel now recommended. The full amount of the share to be paid by the United States, $83,500, should be provided in one appropriation.

5. In compliance with law, the board reports that except as contemplated by the above recommendations, there are no questions of terminal facilities, water power, or other subjects so related to the

project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF PLYMOUTH HARBOR, MASS.

War Department,
United States Engineer Office,
Boston, Mass., October 10, 1910.

Sir: 1. In accordance with instructions contained in department letter of August 4, 1910, I have the honor to submit the following report upon a preliminary examination of Plymouth Harbor, Mass., made in conformity with the river and harbor act of June 25, 1910.

2. Conference with interested parties develops the fact that the work especially desired at this time is identical with that covered by a similar clause contained in the river and harbor act of March 2, 1907, under which full reports of an examination and survey and an accurate map (printed as H. R. Doc. 1168, 60th Cong., 2d sess.) were submitted to Congress under date of December 9, 1908.

3. If a breakwater is not considered worthy of being undertaken by the United States, the investigation of the subject of interior dredging to afford access to the wharves or to naturally sheltered anchorage is desired.

4. Summarized and condensed, the reports above cited show that the movement of sand at the part of the coast involved is from south to north; that three towns have subharbors on the one bay defined on the ocean side by Gurnet Point and Rocky Point; that the entrance to the bay proper is between Long Beach and Saquish Head, two comparatively narrow sand spits, which together form a pair of sand jetties converging toward the inner bay and forcing the flood tide to enter through a comparatively narrow throat; inside of the throat the flood wave expands and fills the comparatively large and shallow inner bay, cutting deep, crooked channels near the throat, but rapidly losing erosive power as its concentrated flow is lost by expansion; that the flood tide enters the bay from the southward, passing over Browns Bank, forming the usual blind flood tide channel nearly through that bar near Long Beach.

5. Inside of the narrow throat above described there are three distinct basins, each having its own crooked and complicated system of channels, probably formed by the concentration of ebb flow. The only large deep natural inner channel is that known as the "Cow Yard," which affords a comparatively small but deep anchorage; one not well sheltered from the heaviest storms which come from the southeast.

6. The history of the bay is shown by its form; Long Beach, Duxbury Beach, and its prolongation inward, known as Saquish Head, are composed almost exclusively of easily moved sand and are simply the physical indications of the resultants of the many forces in action. A tidal rise of 10 feet, a position sheltered in part

by the outer end of Cape Cod, so that the tidal waves as well as storm waves are operating not entirely under free conditions, and an unlimited supply of finely comminuted material with which to record the points where action is the least, have automatically marked out the positions where the forces of tide, wind, and wave have mutually overcome each other.

7. The known history of this locality confirms the above; the records show that in severe storms Long Beach and Duxbury Beach have more than once been broken through, with resulting fear of permanent breaches on the part of local residents, but that up to this time such breaches have always been closed with sand by natural agencies. Long Beach has of late years been subject to more or less continuous erosion, however, and has therefore been protected by heavy riprap extending 12,459 feet.

8. The construction of a breakwater on Browns Bank appears to be the only economically possible solution of the problem of securing a properly sheltered anchorage in the present harbor in times of southeast storms; its crest would have to be 15 or more feet above low-water level, and its length should be not less than 10,000 feet, more probably 15,000 feet. A structure shorter than 10,000 feet might easily modify the conditions of tidal flow and wave action enough to endanger the maintenance of present conditions, without affording sufficient shelter, and local cutting around its outer end might throw large quantities of sand into the outer ship channel, producing shoaling there and perhaps other results far different from those desired. A breakwater of 15,000 feet length would, if properly located, probably increase the channel depths at the entrance, but would so materially modify the direction in which the flood tide enters the interior basin as to seriously affect the channels inside of the present throat. These inner channels are partly formed and maintained by the concentrated flood current which now enters the bay through the funnel-shaped entrance formed by Long Beach and Saquish Point. The ebb currents depend only on the conformation of the inner bay, and would be but little affected; a change in the flood current would change the existing balances of forces and should therefore be expected to produce changed channels, whose depths and positions it would be extremely hazardous to predict.

9. To make it safe to undertake such a radical modification of natural conditions at the entrance of this sand-inclosed harbor, it would be essential to have in hand enough money to do interior dredging, or to construct interior training walls or jetties to guide and control changes in the sandy bottom of the interior bay; the cost of such supplementary works should be covered by the project and should appear in the estimates.

10. It is reported in the appended letter (not printed) of the board of selectmen of Plymouth that the State of Massachusetts and town of Plymouth have completed wharf and harbor betterments costing nearly $250,000, of which dredging alone amounted to $160,000; they have provided sufficient depth to permit vessels drawing about 26 feet to reach the wharf of the cordage company and to lie there in safety. On general principles it is believed to be wise for the United States to come to the assistance of communities which have shown sufficient public spirit to undertake and carry through to successful issue extensive improvements of their natural waterways, if the cost to the General Government bears a reasonable ratio to the sums

expended by the State and local authorities, and this should be considered as well as the absolute amount of existing and prospective commerce.

11. The commercial claims of the locality for recognition by the General Government are well stated in the appended letter; it covers fully the reasons why the breakwater is desired by the citizens of Plymouth, states that the value of the annual manufactures in the town approximates $14,000,000; that raw material from Mexico and the Philippine Islands, and valued at $7,000,000 annually, has up to this time reached the Plymouth Cordage works by rail, but that the new channel provided jointly by the State of Massachusetts and the town of Plymouth will result in its delivery at the cordage company's wharf in the original bottoms, as vessels of 3,500 tons can now reach the wharf; in addition to this $7,000,000 annual foreign imports, a domestic annual commerce of 50,000 tons of coal and lumber valued at about $200,000 and foreign exports amounting to $2,000,000 is claimed, and a passenger business of 30,000 persons; that each winter the United States Fish Commission keeps a steamer at Plymouth collecting codfish spawn; that there are 4,000 vessels per annum seeking anchorage in the harbor; the claim is made that Plymouth actually stands twelfth in the United States in the order of harbors arranged according to the aggregate of imports and exports; that it stands third in the list of such ports in New England, and second in the State of Massachusetts; that Plymouth harbor is the only deep-water inlet between the mouth of the Cape Cod Canal and Boston, about 56 miles apart, the water in Massachusetts Bay being proverbially rough; that the completion of the Cape Cod Canal will bring Plymouth inlet close to the routes of 50,000 vessels passing between New York and Boston; that its entrance is straight and free from outlying shoals and rocks; that there is also a possibility that Plymouth may be the terminus of an intracoastal canal from Taunton River to Boston; that the cordage company, the largest plant making rope and binder twine in the world, distributes its products over the entire United States via a railroad line independent of Boston; that Plymouth is thus a distributing point of distinctive importance; that the harbor is landlocked, 3½ miles in area, with shores not over 2½ miles from deep-water anchorage, with easily deepened interior channels; that between Plymouth and Kingston for 4 miles the railroad track is between 300 and 2,000 feet only from the shores, and that three more miles of railroad to South Duxbury are not far from the shore; that the inlet is 24 feet deep at low tide, is straight and leads to a deep inner anchorage ground; that the town, with only 12,000 inhabitants, has paid out $90,000 for railroad facilities and has contributed largely to the State in paying for deepening its channels of approach; that it is the only port of refuge on Massachusetts Bay south of Boston in reach of $263,000,000 worth of annual commerce passing by sea through Massachusetts Bay, and that 500,000 passengers will make the trip between Boston and New York annually by the Cape Cod Canal; that its commerce exceeds somewhat that of Charleston, S. C., which port has been improved by the United States at a cost of $4,675,000, while the breakwater asked for Plymouth would probably cost not over $1,000,000, one-quarter as much; that the breakwater is outside the harbor proper and can not be built by the State or private parties, being plainly in the province of the General Government; that a prospective commerce of $75,000,000 and 500,000

passengers passing through the Cape Cod Canal will pass directly in front of Plymouth Harbor, or will enter thereat; that the town itself in 1909 voluntarily paid $12,000 to redredge the channel previously dredged to the town wharves by the United States.

12. A map based on the New York, New Haven & Hartford Railroad printed folder, and showing the commercial routes and amount of commerce on each, accompanied the above letter, and a copy is appended to this report.[1]

13. The water frontage of Plymouth Harbor is owned by individuals, local corporations and the town of Plymouth, and wharves of sufficient capacity are available or can be made available to meet the present and prospective demands of the commerce of the locality. None of the wharves is owned by the railroad but the latter is in easy reach of the shore for about seven miles. (For details as to available wharf and terminal facilities see accompanying statement[1] by the chairman of the board of selectmen of the town of Plymouth, Mass., received January 25, 1910.)

14. Uncertainty as to the exact effects of building the proposed breakwater and supplementary works, and their evidently great cost, makes it apparent that the disproportion in the present case between work proposed and that already completed by the State and town is so great that the United States can not be expected to undertake the work alone. Without direct contributions from private or State interests covering fully three-quarters of the cost and all of the maintenance charges, the locality is not worthy of improvement by the United States by the building of a breakwater.

15. The commercial showing made by the selectmen of Plymouth, summarized in paragraph 11, and the creation of a convenient harbor of refuge close to the traffic through the new Cape Cod Canal, justify, however, serious consideration of the alternative plan suggested, that of providing sheltered anchorage space by dredging inside of the throat, so that vessels can get into the lee of Long Beach. The available maps indicate that such an area may be provided, for a not exorbitant sum, and that it can be connected with the water front of the town also. It is believed that the matter is worthy of further study based on an actual survey, which can be made for the sum of $1,000, and the allotment of that sum is recommended.

Very respectfully, your obedient servant,

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, October 18, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendation of Col. Abbot, district engineer officer, that an allotment be made for a survey of Plymouth Harbor.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

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[1] Not printed.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 31, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

1. Under authority of the act of March 2, 1907, a report on preliminary examination and survey of Plymouth Harbor with a view to the construction of a rubblestone breakwater, extending from Long Beach easterly along the crest of Browns Island, was submitted and may be found printed in House Document No. 1168, Sixtieth Congress, second session. For reasons given in that report, the board deemed it inadvisable for the United States to undertake the improvement of the harbor by the construction of a breakwater.

2. The act under which the present examination is made does not specify the character of work contemplated, and the district officer suggests the possibility of a satisfactory improvement to be effected by means of dredging within the harbor, and he recommends further study based upon an actual survey, which he estimates will cost $1,000.

3. In the opinion of the board the importance of the locality as a commercial port and as a harbor of refuge is sufficient to warrant the expenditure necessary to determine the cost of the alternative method of improvement now suggested, and it therefore joins with the division engineer in recommending that the survey be authorized.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 5, 1910.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Plymouth Harbor, Mass., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality as proposed be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *November 7, 1910.*

Approved.

ROBERT SHAW OLIVER,
Acting Secretary of War.

SURVEY OF PLYMOUTH HARBOR, MASS.

War Department,
United States Engineer Office,
Boston, Mass., February 17, 1911.

Sir: 1. In accordance with instructions from your office, dated November 8, 1910, I have the honor to submit the following report upon a survey made in conformity with the provisions of section 3, act of Congress approved June 25, 1910, for survey of Plymouth Harbor, Mass.

2. The State authorities have completed a channel 150 feet wide and 18 feet deep at low water to the water front of the Plymouth Cordage Co., where a suitable permanent wharf is under construction, at which vessels of 3,500 tons burden can lie in safety. As this provides for the commerce of that part of the town of Plymouth, the survey was limited to the portion of the bay between Long Beach and the existing wharves, covering also the shore line as far west as the inner end of Goose Point Channel. The question of dredging an anchorage area under the lee of Long Beach was also investigated.

3. In a preliminary report from this office, dated October 10, 1910, it was shown that the desire of the local authorities was the building of a breakwater on Browns Bank to give a sheltered anchorage; that the building of such a breakwater might endanger the present channels, and that the cost would be so great that it should not be undertaken by the United States unless three-quarters of the original cost and all maintenance charges were guaranteed by the State or by private interests. An approximate location of such a breakwater is shown on the index chart at the upper left-hand corner of the map accompanying this report. Upon further study nothing has been found to throw doubt upon the soundness of the above views.

4. If a breakwater was not recommended the local authorities asked an investigation of the subject of dredging inside of Long Beach. During the survey and the subsequent study of the matter the local authorities have been constantly consulted, and any suggestions they have made have been carefully considered.

5. The local authorities state that the natural channel leading southward toward Plymouth from the deep entrance at the throat of the bay has a fairly constant depth, which depth, as far as the end of Long Beach, the survey shows to be about 15 feet when a width of 300 feet is considered. If this were dredged to 18 feet deep, a vessel entering under stress of weather would have to make a right-angled turn to enter the comparatively narrow channel, and with any easterly winds would have to run fully 3,000 feet close along a very shoal lee shore before the shelter of Long Beach is reached. The maintenance of this 18-foot channel without frequent dredging is questionable. This entrance channel is common to all the three plans subsequently described in this report for the outer 2,000 feet of its length.

6. In continuation of this entrance channel three routes to the wharf front of Plymouth are possible. The first utilizes the natural deep pocket lying under the lee of Long Beach so far as it extends, and beyond that point consists of a dredged channel 18 feet deep and 200 feet wide up to the wharf front of the town. About 762,000 cubic yards of dredging is involved, at a cost of about $167,000.

7. For tugboats running to Boston with tows from the Cape Cod Canal the entrance channel and a safe anchorage area 18 feet deep, 1,000 feet wide, and 3,000 feet long in rear of Long Beach can be provided by dredging 1,802,000 cubic yards, at a cost of $396,000; and the channel described in paragraph 5, from the inner end of this anchorage basin to the wharf front of the town, can be provided by dredging 595,000 cubic yards at an added cost of $130,000. The depth of 18 feet would not permit anchorage of any large steamers or of deep-draft sailing vessels, but it is unlikely that such craft would try to run into Plymouth for safety when a short 30 miles more navigation in deep water would carry them into the safe waters of Boston Harbor; 18 feet will be sufficient for all ordinary tugs and their tows, especially as part of the sheltered area is naturally 24 feet deep, and would thus, even at low tide, accommodate a few exceptionally deep-draft barges. After the anchorage area is once dredged it is probable that it will remain reasonably permanent as it is not exposed to heavy waves, being protected to the northwestward by a large area distant some hundreds of feet, bare at low water, and to the northeastward by Long Beach. Experience has shown that the channel formerly dredged in rear of Long Beach and thence to the town wharves has suffered only reasonable deterioration since its original excavation by dredging.

8. A second solution of the problem, suggested by the local authorities, consists of widening and straightening the natural channel known as Goose Point Channel, leading for about 3,000 feet to the southwestward from near the point of Long Beach, and extending the same by dredging to near the shore line opposite Nelson Street, and thence along parallel to the shore as far as the present basin in front of the town wharves. In favor of this plan is the fact that it would create a long, deep water frontage for the business part of the town, which would permit an extensive development of wharf facilities. The yardage is about 1,756,000 and is estimated to cost about $386,000. The permanence of such a dredged channel lying close under the lee of a sand bar which is dry at extreme low water of spring tides, appears problematical unless some protecting breakwater were erected, but the cost of such a structure would be prohibitive.

9. For purely comparative purposes the yardage along the straight route No. 3, shown on the map, has been computed. It is about 1,364,000 cubic yards, and with the exception of its straightness, offers few advantages and its serious consideration is not recommended.

10. All the estimates given above are for scow measurement at 20 cents per cubic yard, with customary allowance of about 10 per cent for engineering and contingencies. Each estimate includes the section of entrance channel common to all routes. There appeared so little probability of finding ledge rock in the way of any of the proposed dredging that expenditure of either time or money to make borings was deemed unnecessary.

11. A salient feature of Plymouth Harbor is the fact that the bay contains so large a proportion of shoal water that at low tide the water area is not much more than three-fifths as great as at high tide. This has been indicated on the map by dotting all areas dry at mean low tide. The courage and energy of the people

who, in spite of such enormous natural difficulties, have invested their own money freely in efforts to make their town a practical and convenient seaport is apparent. If the General Government, for a reasonable sum, could supplement their work and bring it to a successful issue, it seems that such a community can be trusted to make every effort to utilize the facilities afforded them, which is not always the case where all the work is done at the cost of the United States.

12. A careful analysis of the statistics of commerce submitted by the selectmen of the town of Plymouth, accompanying the report of the preliminary examination, however, throws considerable doubt upon the actual utility of any of the projects above considered: (*a*) It is apparent that the $14,000,000 worth of articles manufactured in the town is largely the product of the cordage works; these works are not accessible from wharves lying upon the proposed basin or channels, but lie on the deep channel already provided by the State and town. (*b*) The foreign imports, reported as $7,000,000 by the selectmen of Plymouth, are expressly stated to be for the cordage works, and if they came by sea they would go to the wharf of that company lying at the inner end of the same State channel. (*c*) The coal and lumber, valued at $200,000, would probably come largely through the proposed United States channel. (*d*) How much of the $2,000,000 "foreign exports" would come from the town wharves, supplied by the woolen mills, etc., and how much from the cordage works is not stated in a form permitting its division between the two, but apparently a large proportion would come from the latter, and would not use the proposed United States channel. (*e*) Passenger traffic, stated at 30,000 per annum, would undoubtedly use the latter channel. (*f*) The Fish Commission would probably lay its vessels at the town wharves, but would conduct its business as at present in the main bay, so as to avoid towage charges on the vessels supplying the spawn. (*g*) That Plymouth is near the route of 50,000 vessels annually passing through the Cape Cod Canal does not necessarily indicate that many would stop to enter the harbor for business or for refuge. The entrance is less than 40 miles from Boston; there is only a comparatively narrow channel, 24 feet deep at low tide, and there is a right-angled turn to be made in rough water before reaching the quiet, inner basin under the shelter of Long Beach. If this turn is avoided it would be necessary to anchor in the rough, deep water of the Cow Yard. Properly equipped steam vessels might, except in extreme cases, run for Boston in spite of adverse weather conditions, while tugs going north with barges in tow would certainly have sufficient warning through the Weather Bureau signals to remain in the sheltered waters of Buzzards Bay or to lie under the lee of the breakwater which will eventually have to be built at the Massachusetts Bay end of the Cape Cod Canal. Tows and sailing vessels from Cape Ann or beyond, bound through the canal, might find a safe harbor at Plymouth a great advantage in case of sudden storms from the northward, at least till a breakwater is built to shelter the entrance to the Cape Cod Canal from waves created by such storms, but even under present conditions the Cow Yard is quiet, with winds from that quarter, so the basin inside of Long Beach would not then be needed.

The total water-borne commerce of Plymouth Harbor during the calendar year 1910 amounted to about 60,500 short tons, of which 21,600 short tons were carried to the wharves of the Plymouth Cordage Co.

13. The proximity of Boston Harbor, already improved at large cost by the United States, raises the question of the propriety of recommending the creation at national expense of an artificial deep harbor only 30 miles distant, but the present time is perhaps not well suited for a fair determination of the worthiness or unworthiness of Plymouth Harbor for further development by the United States. If the completion of the Cape Cod Canal actually results in largely increased use of Plymouth Harbor for imports and exports, or for refuge, further consideration may well be given to the question. At the present time dredging the channel 200 feet wide and 18 feet deep to Plymouth wharves, at a cost of $167,000, is believed to be too costly. The local interests state that a channel 150 feet wide and 18 feet deep at mean low water would put the commerce of the town proper, and of that part of the town occupied by the Plymouth Cordage Works, "upon equality, to which it would seem that the port as a whole, in its commercial importance, is entitled." The original cost of such a channel 150 feet wide is estimated as $125,000, and the annual cost of maintenance at $5,000. Either improvement is believed to be too costly when compared with the present water-borne commerce of this locality, and I am, therefore, constrained to report that Plymouth Harbor is not now worthy of further improvement by the United States, but that it is not impossible that the work already done by local authorities and the completion of the Cape Cod Canal may result in future commercial growth such as to make the harbor worthy of the construction of the 200 foot channel 18 feet deep at mean low water, at a cost of $167,000.

Very respectfully, your obedient servant,

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, February 21, 1911.

Respectfully forwarded to the Chief of Engineers, concurring in the opinion of the district engineer officer that Plymouth Harbor is not worthy of further improvement by the General Government at the present time.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

SUPPLEMENTARY REPORT ON PRELIMINARY EXAMINATION AND SURVEY OF PLYMOUTH HARBOR, MASS.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Boston, Mass., November 23, 1912.

SIR: (1) For a 12-foot channel, 150 feet wide, beginning 200 feet off the end of Long Wharf, where the present anchorage basin begins, and extending to 12 feet depth at the outer end, with side slopes 1 on 7, and allowing 1 foot for overdepth dredging, the yardage measured in scows would be 104,500. For a 15-foot channel, 150 feet wide, beginning 200 feet off the end of Long Wharf, where the present anchorage basin begins, and extending to 15 feet depth at the outer end, with side slopes 1 on 7, and allowing 1 foot for overdepth dredging, the yardage measured in scows would be 275,000. These estimates cover for both depths a width of 250 feet at the right-angled turn near Long Beach, and of 200 feet at the turn near the end of Long Beach.

Estimate.

12-foot channel, 104,500 cubic yards	$28,800
15-foot channel, 275,000 cubic yards	66,500

(2) In the presentation of their case the local interests have consistently laid much stress on the approaching completion of the Cape Cod Canal, which will provide 25 feet depth at low water. If the Plymouth channel is made 18 feet deep this will permit anything that can go through the Cape Cod Canal at high water to enter Plymouth at high water, due to the fact that the range of tide at Plymouth is greater than in Buzzards Bay; with less than 18 feet this would not be true.

The size of coal-carrying craft has been steadily increasing of late years, and the depth of 18 feet and width of 200 feet in the original report were selected after very careful study of the type of craft that will probably pass through the Cape Cod Canal, and thus follow a route close to Plymouth Harbor entrance. It is not to be anticipated that small coal-carrying craft will be specially chartered to run to Plymouth; their exposure to ocean storms in the part of their route from Fishers Island Sound to Buzzards Bay would make such a charter party costly. It is now hard to get barges of sufficiently light draft to enter Newburyport, where 15 feet is guaranteed on the charter parties, and so 17-foot barges are often entered there at considerable risk, because smaller ones are not available. The history of improvements on the New England coast illustrates the excessive cost of providing slight increases in depth, to be followed by subsequent slight betterments. Shallow dredging is costly, because of the frequent moving of dredges and scows with small output of dredges per day, and because the bottom must be cleared of lumps for each successive projected depth, and deductions must be made for successive overdepths, which lead to increased prices every time a contract is let to redredge previous work. The contractor's increase of price to cover only one clearing up and one probable deduction for overdepth is all the United States has to pay when the really desirable depth is given a channel at the beginning. Reasoning along these lines, I report adversely as to the advisability of dredging any channel at Plymouth 12 feet deep. I report adversely as to the advisability of dredging any channel at Plymouth 15 feet deep. In this view I am supported by the following clause of a letter from the Board of Harbor and Land Commissioners of the State of Massachusetts, dated November 21, 1912:

> The board is of the opinion that if the channel leading to the wharves in Plymouth Harbor is to be improved, a depth of not less than 18 feet at mean low water should be provided.

(3) In reporting on the amount of cooperation that should be asked of the State as a condition precedent to the initiation of work by the United States, the above plainly indicates that for a 12-foot or a 15-foot channel no cooperation should be asked of the State. Without cooperation the work should not be undertaken by the United States. For an 18-foot channel the Harbor and Land Commissioners offer the following cooperation:

> The board, considering the limited amount at its disposal for harbor improvement, is unwilling to make any allotment from the appropriation which it is authorized to expend under the provisions of chapter 481 of the acts of 1909, and chapter 642 of the acts of 1912, for the purpose of defraying a portion of the cost of improving Plymouth Harbor by the General Government in accordance with a project, the cost of which is estimated at $167,000; but it will, either in its next annual report to the legislature, in January, 1913, or before any legislative committee before which this matter would come, recommend or advocate a special appropriation by the legislature for the further improvement of this harbor, in accordance with such project as may be adopted by the General Government, the same to be used in connection with such appropriation as may be made by Congress, and as a contribution by the State of Massachusetts, towards defraying a portion of the cost of carrying such project into effect.

In my judgment one-half would be a fair proportion for the State to pay. If a clause be inserted in the next river and harbor act of Congress making the expenditure of any funds for the proposed Plymouth channel conditional upon the pledging of State funds to the extent of one-half the cost of the 18-foot channel (estimated in the preceding report at $167,000), I regard the locality as worthy of improvement to the amount of the balance (estimated at $83,500), to be applied to creating a channel 18 feet deep, 200 feet wide, suitably widened at the bends, as shown on the map accompanying the original report from this office dated February 17, 1911.

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

LETTER OF THE BOARD OF HARBOR AND LAND COMMISSIONERS OF THE COMMONWEALTH OF MASSACHUSETTS.

COMMONWEALTH OF MASSACHUSETTS,
BOARD OF HARBOR AND LAND COMMISSIONERS,
Boston, August 16, 1912.

GENTLEMEN: The Board of Harbor and Land Commissioners of Massachusetts begs to inform you that a communication under date of July 29, 1912, signed by the members of the board of selectmen of the town of Plymouth and by Charles C. Doten, harbor engineer for said town, in relation to a survey and report on the improvement of Plymouth Harbor made by the United States District Engineer officer at Boston under authority of a recent act of Congress, has been received and that at a conference with representatives of the town of Plymouth and the town's harbor engineer on August 14, 1912, it was stated that a report of the Engineer officer, Col. Abbot, on the subject of this harbor is now before the United States Board of Engineers for Rivers and Harbors for action.

It was requested that the harbor and land commissioners consider this matter and acquaint the United States board with its attitude toward the desired improvement.

After consideration, this commission is of the opinion that this harbor is worthy of further improvement and that the State should cooperate with the Federal Government, either by making an allotment from the appropriation for 1913, under authority of chapter 642 of the acts of 1912, available for river and harbor improvements, or by recommending a special appropriation by the legislature for the purpose of defraying a portion of the cost of the improvement of this harbor, which the board is informed is estimated to be $167,000.

Respectfully, for the board.

Wm. S. McNary,
Chairman.

To the Board of Engineers for Rivers and Harbors.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1196.

SCUPPERNONG RIVER, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF SCUPPERNONG RIVER, N. C., TO THE TOWN OF CHERRY.

January 2, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, December 21, 1912.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 19th instant, together with copies of reports from Capt. (now Maj.) E. I. Brown, and Capt. (now Maj.) H. W. Stickle, Corps of Engineers, dated December 30, 1910, and February 12, 1912, with map, on preliminary examination and survey, respectively, of Scuppernong River, N. C., to the town of Cherry, made by them in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, December 19, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Scuppernong River, N. C.

1. There are submitted herewith, for transmission to Congress, reports dated December 30, 1910, by Capt. (now Maj.), E. I. Brown, Corps of Engineers, and February 12, 1912, with map, by Capt. (now

Maj.), H. W. Stickle, Corps of Engineers, on preliminary examination and survey, respectively, of Scuppernong River, N. C., to the town of Cherry, authorized by the river and harbor act approved June 25, 1910.

2. Scuppernong River, on the southern shore of Albemarle Sound, has been under improvement by the United States since 1876, under projects providing for dredging the bar, making cut-offs at sharp bends, and removing obstructions from the channel up to Spruills Bridge, the landing for the village of Creswell, 23 miles above the mouth. Cherry, 26 miles from its mouth, is head of navigation, to which point 5 feet can be carried at mean low water. Existing depths in the stream appear to be ample for the boats now using it, but above Cross Landing navigation is rendered difficult on account of the bends and obstructions.

3. The district officer submits with favorable recommendation a plan for further improvement contemplating (a) a channel 150 feet wide on bottom and 10 feet deep at mean low water across the bar, and a channel 100 feet wide on bottom and 10 feet deep from the bar up to and including the town of Columbia; (b) a channel 40 feet wide on bottom and 8 feet deep from Columbia to Spruills Bridge near Creswell, including several cut-offs; (c) a channel 30 feet wide on bottom and 7 feet deep from Spruills Bridge to the fixed highway bridge near Cherry, involving work at about 20 points, and a turning basin of a triangular plan 150 feet wide on a side 7 feet deep over the entire triangular area near Cherry bridge at the mouth of Mauls Creek, at a total estimated cost of $31,800 and $1,000 annually for maintenance. The division engineer concurs in recommending this improvement.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated February 26, 1912, concurring in the opinion of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Scuppernong River, N. C., is deemed advisable so far as to secure an available channel depth of 10 feet and a channel width of 150 feet across the bar at the mouth; thence 100 feet wide and 10 feet deep to Columbia; thence 40 feet wide and 8 feet deep to Spruills Bridge; thence 30 feet wide and 7 feet deep to the highway bridge near Cherry, and the construction of a turning basin near Cherry, following in general the methods described in the report of the district officer at an estimated cost of $31,800 for first construction and $1,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 26, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. A survey of Scuppernong River having been made by the district officer, he submits a project for further improvement from the mouth to Cherry, as follows:

a. A channel of 150 feet bottom width and 10 feet depth across the bar; and a channel of 100 feet bottom width and 10 feet depth from the bar to and including the town of Columbia.

b. A channel of 40 feet bottom width and 8 feet depth from Columbia to Spruills Bridge, near Creswell, including cut-offs shown on sheets 4 and 5.[1]

c. A channel of 30 feet bottom width and 7 feet depth from Spruills Bridge to the fixed highway bridge, near Cherry, the work required at 20 points being shown on sheets 5 and 6, and a turning basin of a triangular plan, 150 feet on a side, with a depth of 7 feet over the entire triangular area, near Cherry Bridge, at the mouth of Mauls Creek. The total cost of this work is estimated at $31,800, with $1,000 annually for maintenance.

3. The commerce of the locality is fully described in the report on preliminary examination. Since the submission of that report, the statistics for the year 1910 have become available, showing for that year a commerce of 29,194 tons, valued at $308,676, an increase of 42 per cent over the preceding year. Having in mind the productiveness of the contiguous territory and believing that further increase of commerce can be reasonably anticipated, the district officer expresses the opinion that the improvement outlined is justified in the interests of present and prospective commerce. After consideration of the facts presented, the board joins the division engineer in believing that it is advisable for the United States to undertake the further improvement of Scuppernong River in the manner and to the extent proposed by the district officer, at a total estimated cost of $31,800, the full amount of which should be provided in one appropriation.

4. In compliance with law, the board reports that there are no questions of waterpower, terminal facilities, or other related subjects which could be advantageously coordinated with the recommended improvement to lessen the cost thereof and compensate the Government for expenditures made in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL
Colonel, Corps of Engineers,
Senior Member of the Boar .

PRELIMINARY EXAMINATION OF SCUPPERNONG RIVER, N. C.

UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., December 30, 1910.

SIR: 1. I have the honor to submit the following report of a preliminary examination of Scuppernong River, N. C., made by me pursuant to the provisions of the river and harbor act of June 25, 1910.

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[1] Not printed.

2. Between Roanoke River and Albemarle Sound on the north, and Pamlico River and Sound on the south, there lies a peninsula of the richest agricultural lands in the State. Scuppernong River rises in the center of this peninsula and flows northerly into Albemarle Sound, making a long bend to the eastward, to the town of Columbia, then turning westward again until it flows into the sound.

3. As may be judged from the map, the relief of this peninsula is slight and it was formerly covered with vast swamps which were thought to be irreclaimable, and valuable only for the magnificent timber which they produced.

4. It was found, however, that when the land was reclaimed from the swamp and was put under cultivation that it produced unsurpassed crops, and that the fertility of the soil was almost inexhaustible. The prevalence of water in the soil, and the lack of cooperation in the undertaking of any extensive drainage operations, however, militated against the rapid development of this section.

5. Within the past five or six years its inhabitants have awakened to the practicability of such cooperative undertakings, and to the immense value and productiveness of their land when so reclaimed.

6. Drainage operations are now being conducted on a large scale in several quarters, plans even being prepared for the drainage of Lake Mattamuskeet, one of the largest in the peninsula.

7. Several drainage canals have been constructed for the drainage of lands along the Scuppernong River, and two are now being constructed near the upper end of the river.

8. Columbia, the county seat of Tyrrell County, in which most of the river lies, is 5 miles above the mouth of the river. Cross Landing, a small settlement, is 14 miles, and Spruills Bridge, the landing for the village of Creswell, is 23 miles from the mouth. The town of Cherry is 3 miles farther, or 26 miles from the mouth.

9. Spruills Bridge, to which a depth of 7 feet can be carried, has always been considered as the head of navigation.

10. This stream has been under improvement by the United States since 1876, the original project adopted in that year being to dredge the bar, make cut-offs at sharp bends, and remove obstructions so as to obtain a channel 60 feet wide and 9 feet deep at low water up to Spruills Bridge. This project was amended by the act of June 13, 1902, to provide for a channel 9 feet deep and 150 feet wide across the bar at the mouth. These projects have been completed, and the project depth exists on the bar. From the bar 14 miles to Cross Landing the river has a good open channel 300 to 100 feet wide, narrowing down as the stream is ascended; thence to Spruills Bridge, 9 miles farther, the depth of 7 feet still is available, but the stream is narrower and more crooked and is badly obstructed by overhanging trees and by small logs and snags in the channel.

11. In the next 1½ miles above Spruills Bridge the stream maintains its narrow and tortuous character, the depth decreasing to about 6 feet and the width to 50 to 60 feet. Above this point the river has been converted into a drainage canal 40 feet wide and 7 to 8 feet deep, which continues for some distance beyond the town of Cherry.

12. Boats could now reach the town of Cherry if the overhanging trees and the obstructing logs and snags in the river were removed and some of the worst bends straightened.

13. This river has twice before been the subject of preliminary examinations, in 1895, by Maj. W. S. Stanton, Corps of Engineers, printed on page 1360, Report of the Chief of Engineers for 1895, and by Capt. E. W. Van C. Lucas, Corps of Engineers, printed in House Document 131, Fifty-sixth Congress, second session. The first report was unfavorable to any improvement then because the small commerce and the sparse population could be amply served by the river in its condition at that time.

14. The report of 1902 covered some proposed improvements at the bar, and was a favorable one, resulting in the adoption of the present project.

15. The improvements made to date have resulted in placing the commerce upon a substantial basis, except for a severe blow received in 1908. Prior to that time there were no railroads in this section, and all transportation of products to market at Edenton, Elizabeth City, and Norfolk was dependent entirely upon water. During 1908, a branch of the Norfolk Southern Railroad was extended to Creswell and Columbia, along the west shore of the river, connecting with the main line of this road near Mackeys Ferry on Albemarle Sound. This, combined with the financial panic of that year, resulted in a great decrease in river commerce, the tonnage falling from 68,630 in 1907, to 12,515 in 1908. The following year, however, it rose to 20,556 tons, and indications are that it will continue to increase.

16. The Branning Manufacturing Co., located at Columbia, handles about 8,000,000 feet of lumber per annum. The Pittsburg Lumber Co., near Lake Phelps, handles 300,000 feet, the Scuppernong Milling Co., at Columbia, 1,500,000 feet, and other minor plants about 500,000 feet, about one-half of which is shipped by rail, and one-half is carried by water on the standard lumber barge of 6 to 8½ feet draft and 150 to 200 feet long. These barges have great difficulty in going above Columbia, and can not reach Spruills Bridge on account of the sharp bends.

17. Generally speaking the depth of water in this stream appears to be ample for the 1 steamer and 25 schooners that navigate this river, but they dislike to go above Cross Landing on account of the great difficulty they have in navigating this portion of the river. It is said to take vessels as long to reach Creswell (Spruills Bridge) from Columbia, 15 miles, as to go to Edenton, 30 miles. Boats as large as 80 tons have reached there, but with difficulty.

18. There are about 58,000 acres of cultivated land lying within 3 miles of the river, which are forced to raise only corn and cotton, staple products, because they will stand the test of time. This land should raise about 25,000 bales of cotton, and 25,000 bushels of corn, but on account of the high cost of marketing the products, by reason of uncertain water transportation, the production is greatly curtailed. The land north and west of the river has the benefit of rail transportation, but that south and east is cut off from all but the river. The farmers themselves expect to extend navigation for barges from the river up their drainage canals as much as 10 miles from the river, provided they can be gotten up the river.

19. In addition to the resulting development from some improvement of this portion of the river, there would be a considerable saving in the matter of freight rates. Some of the comparative rates are as follows: Cotton, by rail to Norfolk, 75 cents a bale; by water, 30 cents;

potatoes, 25 cents per barrel; by water, 15 cents; fertilizer, $1.50 per ton, and hauling by wagon at $2.25 per ton; by water, $1.25 per ton and a shorter wagon haul; lumber is shipped by rail to Norfolk at $4.25 per M; by boat at $2.25, and the cost by boat is about one-third greater than it would be if navigation were easier. Freight on coal is $2.25 per ton by rail; by boat it is 50 cents, and other items in proportion.

20. As no adequate survey of this stream has ever been made, an estimate as to the extent and cost of the proposed cut-offs and snagging can not be made at present. It appears that the cost should not be very great, however, and I believe that the benefits to existing commerce and the prospective increase that would result from bettering transportation difficulties are sufficient to warrant a report that this stream is worthy of improvement by the United States.

21. Tabulated statements of commercial statistics accompany this report.

22. There are eight wharves at Columbia, all owned by private parties. The Norfolk Southern Railroad Co. has a wharf with rail connections here, where freight may be transferred from rail to water and vice versa. There are eight landings between Columbia and Spruills Bridge. There are two wharves at the latter place, owned by private parties, which are open to the public at the rate of $3 per day.

23. There are no questions of water power, flood protection, or other related subjects to be considered in connection with the proposed improvement.

24. The cost of a survey from Cherry to the mouth of the river, for the preparation of proper plans and estimates for the improvement, will cost $3,000.

Respectfully submitted.

Earl I. Brown,
Captain, Corps of Engineers.

The Chief of Engineers, United States Army
(Through the Division Engineer).

[First indorsement.]

Office of the Division Engineer, Southeast Division,
Savannah, Ga., January 3, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army.

I agree with the district officer that this river is worthy of a survey, and recommend the allotment of $3,000 for the purpose.

Dan C. Kingman,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, January 17, 1911.

Respectfully returned to the Chief of Engineers, United States Army.

1. This stream has been under improvement by the United States since 1876, and the project, as amended by the act of June 13, 1902, has been completed and the authorized depth of 9 feet exists across

the bar. The total expenditures to June 30, 1910, have been $27,750. The district officer reports that from the bar 14 miles to Cross Landing the river has a good open channel 100 to 300 feet wide, narrowing as the stream is ascended; thence to Spruills Bridge, 9 miles farther, a depth of 7 feet is available, but the stream is narrower and more crooked and is badly obstructed by overhanging trees and by small logs and snags in the channel. In the next 1½ miles the stream maintains its narrow and tortuous character, the depth decreasing to about 6 feet and the width to 50 to 60 feet. Above this point the river has been converted into a drainage canal 40 feet wide and 7 to 8 feet deep, continuing for some distance beyond the town of Cherry.

2. The depth in the stream appears to be ample for the boats now using it, but navigation above Cross Landing is rendered difficult on account of the bends and obstructions. The district officer believes that the cost of removing the snags, etc., and making certain desirable cut-offs will not be very great, and believing that the river is worthy of improvement by the United States he recommends the authorization of a survey from Cherry to the mouth, at an estimated cost of $3,000. The division engineer concurs in this recommendation.

3. It appears that the contiguous territory is of high fertility and that its reclamation by drainage is in progress. While the present commerce consists largely of lumber and its products, conditions seem to warrant the belief that the raising of cotton, corn, potatoes, and other agricultural products will be stimulated as a result of the drainage of the swamp land and the commerce of the stream correspondingly augmented.

4. Reserving its opinion as to the advisability of further improvement of the river, the board recommends that a survey be made as advocated by the district officer and the division engineer in order to furnish data deemed essential in reaching a final conclusion.

For the board:

W. C. Langfitt,
Lieut. Col., Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, January 23, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Scuppernong River, N. C., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality (i. e., up to Cherry) as proposed be authorized.

W. H. Bixby,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

War Department, *January 24, 1911.*

Approved as recommended by the Chief of Engineers.

Robert Shaw Oliver,
Assistant Secretary of War.

Statement of commerce from 1886 to 1909, inclusive, for Scuppernong River, N. C.

[Expressed in tons of 2,000 pounds.]

Item.	1886	1894	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
Brick	......	......	......	......	......	......	......	......	......	20	......	139
Coal and minerals	......	......	......	......	......	......	290		400	650	600	35
Cotton	625	388	......	......	556	419	500	1,195	711	1,000	80	99
Cotton seed	......	......	......	......	512	395	1,665	......	......	300	20	......
Cotton seed meal	......	......	......	......	......	......	......	......	......	100	......	5
Eggs	11	13	......	......	104	113	28	103	105	53	6	28
Fertilizers	400	......	......	......	967	1,912	1,000	2,241	2,348	2,200	240	345
Fish and oysters	......	......	......	......	......	221	38	46	53	80	......	11
Grain, hay, and straw	303	350	......	......	1	......	38	109	249	710	......	119
Live stock	......	......	......	......	113	166	650	291	271	590	16	276
Lumber, timber, ties, etc.	14,625	14,625	62,000	......	25,530	30,796	40,340	41,839	31,322	53,092	9,142	15,615
Machinery	......	......	......	......	......	......	50	......	......	50	......	5
Poultry	......	......	......	......	36	40	23	37	50	80	11	23
Rice	357	......	......	......	......	......	11	......	......	......	......	......
Shingles	1,325	1,311	20,338	......	1,065	7,000	......	......	......	40	320	308
Turpentine, spirits	......	......	......	......	......	......	......	......	75	50	300	......
Unclassified	550	1,232	5,943	......	5,412	5,151	6,840	9,276	9,325	9,665	1,780	3,548
Total	18,196	17,919	88,281	......	34,286	46,213	51,473	55,137	44,909	68,630	12,615	20,556

Statement of freight traffic on Scuppernong River, N. C., for the year ending December 31, 1909.

Article.	Amount (customary units).	Amount in short tons.	Valuation.	Average haul or distance freight was carried (miles).
UPSTREAM.				
Brick	55.5 thousand	139	$417	6
Coal and minerals	35 tons	35	175	5
Cottonseed meal	5 tons	5	125	5
Fertilizers	345 tons	345	10,350	7
Fish	65 barrels	3	240	5
General merchandise	2,055 tons	2,055	287,700	5
Grain	700 bushels	18	630	5
Hay	2,014 bales	101	2,020	5
Horses	91 head	46	9,200	5
Lumber	100 M feet b. m.	200	2,000	5
Machinery	5 tons	5	500	5
Potatoes	1,500 bushels	45	900	5
Tar	34 barrels	5	75	6
Timber	150 M feet b. m.	600	2,400	5
Vegetables	520 barrels	26	520	5
Total	....	3,628	317,252	....
DOWNSTREAM.				
Cattle	690 head	173	10,380	6
Cotton	350 bales	99	23,760	6
Eggs	1,400 crates	28	11,200	7
Fish	150 barrels	8	640	5
Hogs	1,900 head	57	5,700	5
Lumber	7,385 M feet b. m.	14,770	147,700	15
Poultry	11,345 head	23	4,600	6
Peanuts	7,185 bushels	108	6,480	5
Potatoes	42,390 bushels	1,271	25,420	6
Shingles	615 thousand	308	2,464	5
Vegetables	768 barrels	38	760	5
Wood	45 cords	45	45	14
Total	....	16,928	239,149	....
Total for stream	....	20,556	556,401	....

SURVEY OF SCUPPERNONG RIVER, N. C.

War Department,
United States Engineer Office,
Wilmington, N. C., February 12, 1912.

Sir: 1. In accordance with instructions contained in letter from your office dated January 27, 1911, I have the honor to submit my report on the survey of Scuppernong River, N. C., to the town of Cherry, with project and plans for its improvement and estimate of the cost of said improvement and of the cost of maintenance after the project may have been completed.

2. The commercial interests of the locality are stated in paragraph 15 of the report upon preliminary examination by this office, dated December 30, 1910. The total commerce for the stream for the year 1910 was 29,194 tons, with a valuation of $308,676, showing an increase over the preceding year of 8,638 tons, or 42 per cent. It is thought that this commerce will increase rapidly and with the execution of the improvements hereinafter recommended that the tonnage would rise above that reported for 1907—i. e., 68,630 tons. The construction of the extension of the Norfolk Southern Railroad from Mackeys Ferry in 1908 and the financial panic of that year combined to reduce the commerce reported in 1907 by 82 per cent in 1908.

3. Scuppernong River rises in Washington County, in the center of a peninsula between Roanoke River and Albemarle Sound, on the south, this peninsula containing the richest agricultural lands in the State. It flows in a general northeasterly direction through Tyrell County and empties into Albemarle Sound.

4. Tyrell County and that part of Washington County tributary to the Scuppernong River have for other transportation agency only the Norfolk Southern Railroad from Mackeys Ferry to Columbia. In paragraph 19 of the preliminary examination report are cited some comparative rates by rail and by water to Norfolk, Va., one of the principal markets for products from this vicinity. Although it is shown that at present the transportation cost is generally less than half by water than by rail, if navigation were easier the cost by water would be reduced by one-third.

5. The survey of Scuppernong River was made in April, May, August, and September, 1911, and January, 1912. Columbia, the county seat of Tyrell County, in which county most of the river lies, is 5 miles above the mouth of the river; Cross Landing, a small settlement, is 14 miles, and Spruills Bridge, the landing for the village of Creswell, is 23 miles from the mouth. The town of Cherry is 3 miles farther, or 26 miles from the mouth.

6. The stream is crossed by five bridges at and below Cherry:

(*a*) Fixed truss, 40-foot span highway bridge, with 6-foot clearance at mean low water, at Cherry, the head of the improvement hereinafter proposed.

(*b*) Spruills, highway bridge, at Creswell, a Washington County 85-foot bridge, with a slide draw of single clear span of 30 feet.

(*c*) Cross Landing Bridge, a Tyrell County bridge 150 feet long, having a swing draw of single clear span of 30 feet.

(*d*) Norfolk Southern Railroad Bridge, at Columbia, 640 feet long, with swing draw of single clear span of 39.5 feet.

(*e*) Tyrell County Bridge, at Columbia, 575 feet long, having swing draw of single clear span of 39 feet.

7. The river is nontidal, the surface level being governed by wind tides, which cause maximum ordinary variation of 1 foot. It frequently happens that the current is upstream. The river is not subject to freshets.

8. It will be noted from the map (in 6 sheets[1]) accompanying this report that at the time of the survey there was a depth of 6.6 feet over the ocean bar. Below Columbia there are one shoal and one narrow portion which require dredging. Between Columbia and Spruills Bridge, to make 8-foot navigation easy, six cut-offs are necessary and one widening of the stream, as shown on sheets 4 and 5. Above Spruills Bridge, to Cherry, for a 7-foot navigation, besides dredging for depth, dredging for cut-offs, widening, and turning basin is required in 20 places.

9. The appropriations which have been made for improvement and maintenance of this river are given in Appendix M-1, Report of the Chief of Engineers for 1911, p. 1514, and amount in all to $30,000. The existing project provides for a channel 9 feet deep and 150 feet wide across the bar at the mouth, and a channel from the bar to Spruills Bridge, the improvement to consist principally in cutting off several sharp bends and in removing a few stumps from the channel. No original authority has been found for that portion of a project mentioned in paragraph 10, preliminary examination report, which reads "so as to obtain a channel 60 feet wide and 9 feet deep at low water up to Spruills Bridge," and the original appropriation for this work was made in 1878, no preliminary examination or survey report having been submitted prior to the appropriation.

10. Detailed statements covering productiveness of this locality, the existing enterprises, and the commercial conditions and possibilities are to be found in the table of commercial statistics accompanying that report. There is a healthy interest shown by the inhabitants in the proposed improvement of the stream to Cherry. Since the preliminary examination report was submitted commercial statistics for the calendar year 1910 were collected, and are to be found in the Annual Report of the Chief of Engineers for 1911, page 1514. Other than the commercial statistics, no extraneous facts or arguments bearing on the question of this improvement have come to the attention of this office since the report upon the preliminary examination, dated December 30, 1910, was submitted. Ample confirmation of the productiveness of this country and of the views expressed in the preliminary examination report as to the probable advantages of improvement were had throughout the survey.

11. Cherry is located in the midst of a great area of excellent farming land. Attention is invited to paragraph 18 of the preliminary examination report. The special advantage of extending navigation facilities as far up as Cherry on this river consist in addition to providing a market for staple products, corn, cotton, etc., that of providing certain water transportation to encourage the production of more perishable products.

12. The material to be removed from the bar is sand, which shifts readily, and in the dredging estimate for this point a side slope of 1:5 was assumed. Above this point, more stable bank material is encountered, and side slopes of 1:3 below Columbia and 1:2 above Columbia

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[1] Only one sheet printed.

have been adopted in preparing the estimates. At the entrance channel the most severe storms are from the northwest, and their effect is to keep the channel clear, while minor storms from the northeast cause shoaling at the bar. Above Columbia the bed is a soft alluvial mud, covered with logs and roots. The banks are low and swampy, averaging about 1½ feet above the water surface, and in most cases defined only by living growths of trees and water brush. A considerable amount of snagging will be required, and at the proposed cut-offs heavy clearing must be done. The necessary snagging has been included in the estimates.

13. There are no established bench marks of the United States Geological Survey or United States Coast and Geodetic Survey to be found, and the plane of mean low water was determined by one month's reading of tide gauges. The lower portion of this stream appears on Coast Chart No. 141.

14. The facilities now needed are:

(*a*) A channel of 150 feet bottom width and 10 feet depth at mean low water across the bar.

(*b*) A channel of 100 feet bottom width and 10 feet depth at mean low water from the bar to and including the town of Columbia.

(*c*) A channel of 40 feet bottom width and 8 feet depth at mean low water from Columbia to Spruills Bridge, near Creswell, including cut-offs shown on sheets 4 and 5.

(*d*) A channel of 30 feet bottom width and 7 feet depth at mean low water from Spruills Bridge to the fixed highway bridge near Cherry, the work required at 20 points being shown on sheets Nos. 5 and 6.

(*e*) A turning basin of a triangular plan, 150 feet on a side, with a 7-foot depth at mean low water over the entire triangular area, near Cherry Bridge, at the mouth of Mauls Creek.

It will be noted that between Columbia and Spruills Bridge the proposed improvement calls for a much less width and depth than the one which has been reported as having been the original project of 1876, to wit, 60 feet wide and 9 feet deep.

15. The cost of improving the stream to provide the navigation facilities designated is estimated as follows:

	Improvement.	Annual maintenance.
(a) 43,126 cu. yds., at 15 cents	$6,468.90	$800.00
(b) 5,759 cu. yds., at 15 cents	863.85	(1)
(c) 48,746 cu. yds., at 25 cents	12,186.50	....
Clearing	575.00	100.00
(d) 37,399 cu. yds., at 25 cents	9,349.75	....
Clearing	1,175.00	100.00
(e) 4,194 cu. yds., at 25 cents	1,048.50	....
Clearing	100.00	(1)
Total	31,767.50	1,000.00

[1] Negligible.

It is thought that the work outlined will meet the present and prospective navigation requirements on this stream.

16. The work should be prosecuted at a rate sufficient to complete the improvement within six months after commencement, and the entire amount should be appropriated at one time, in case the project be adopted by Congress.

17. It is my opinion that the improvement of this river General Government to the extent of $31,800 is justified present and prospective commercial interests involved.

18. The wharves on this stream are stated in paragraph 22 preliminary examination report.

19. There are no questions of water power, flood protect other related subjects to be considered in connection with th posed improvement.

Very respectfully,

H. W. STICKLE,
Captain, Corps of Engin

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savanah, Ga., February 15, 1

Respectfully forwarded to the Chief of Engineers, United Army.

I agree with the district officer that this river is worthy of im ment to the extent which he proposes.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engin

[For Report of the Board of Engineers for Rivers and Harbo survey, see p. 3.]

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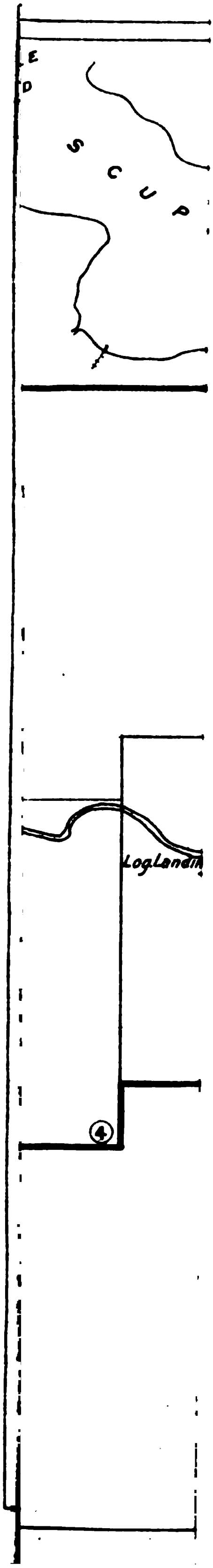

62d Congress, } HOUSE OF REPRESENTATIVES. { Document
3d Session. } { No. 1199.

CHANNEL BETWEEN GREAT PECONIC AND LITTLE PECONIC BAYS, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF CHANNEL BETWEEN GREAT PECONIC AND LITTLE PECONIC BAYS, N. Y.

January 2, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, December 28, 1912.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 26th instant, together with copy of a report from Col. S. W. Roessler, Corps of Engineers, dated November 4, 1912, on preliminary examination of channel between Great Peconic Bay and Little Peconic Bay, Long Island, N. Y., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, December 26, 1912.

From: The Chief of Engineers.
To: Secretary of War.
Subject: Preliminary examination of channel between Great Peconic Bay and Little Peconic Bay, Long Island, N. Y.

1. There is submitted herewith, for transmission to Congress, report dated November 4, 1912, by Col. S. W. Roessler, Corps of Engineers, on preliminary examination of channel between Great Peconic Bay

and Little Peconic Bay, Long Island, N. Y., called for by the river and harbor act approved July 25, 1912.

2. The channel connecting these bays has an available depth of 14 feet. The principal industry dependent upon the use of these waters is oyster growing and fishing, for which the present channel depth is ample. The deepening of the channel for boats drawing from 16 to 18 feet was desired by yacht owners having homes in the vicinity, but it appears that these interests have raised by subscription the funds required for the work and expect to dredge the channel during the coming winter and spring. The district officer reports that there is no present or prospective commerce through the Peconic Bays which would be benefited by the improvement, and he is of opinion that the project is not worthy to be undertaken by the United States. In this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated December 6, 1912, concurring with the views of the district officer and division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of channel between Great Peconic Bay and Little Peconic Bay, Long Island, N. Y., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 6, 1912.

To the Chief of Engineers, United States Army:

1. The channel between Great Peconic Bay and Little Peconic Bay has an available depth of 14 feet. The tidal oscillation is 2 feet to 2½ feet. The principal industry dependent upon the use of these waters is oyster growing and fishing. There is no commerce utilizing the full available depth in the channel under consideration and no prospect of such a commerce.

2. It appears that the improvement is desired by the owners of pleasure yachts having a draft of 16 to 18 feet, and that since the examination was asked for these interests have raised a fund by subscription and propose to do the work themselves.

3. The district officer states that the improvement desired is wholly unrelated to any general commerce or navigation, and that it ought to be made, if at all, by the persons who want it. He expresses the opinion, in which the division engineer concurs, that this is not a project worthy to be undertaken by the United States.

4. The usual notice of unfavorable report was sent out by the district officer, but no communications on the subject of this improvement have been received by the board.

5. In view of the facts presented the board concurs with the district officer and the division engineer, and reports that it is not advisable for the United States to undertake the improvement of the channel between Great Peconic Bay and Little Peconic Bay.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF CHANNEL BETWEEN GREAT PECONIC AND LITTLE PECONIC BAYS, N. Y.

War Department,
United States Engineer Office,
New York, N. Y., November 4, 1912.

From: The district engineer officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination, channel between Great Peconic Bay and Little Peconic Bay, L. I., N. Y.

1. This examination, ordered by the river and harbor act of 1912 and assigned to me, was made October 29, 1912, and the following report is submitted:

2. Great Peconic Bay is a tidal basin 6 miles in diameter, connecting with the ocean through Little Peconic Bay and Shelter Island Sound. Great and Little Peconic Bays are separated by Robbins Island, the main channel between them being south of the island, and having a width of nearly 1 mile, with available depths of 14 feet. Both the bays have large areas with 21 feet depth or more, shoaling gradually to the shores, which are flat sand reaches or low sand hills. Shinnecock Canal, built by the State of New York, has a narrow channel of about 5 feet available depth connecting Great Peconic Bay with Shinnecock Bay. The bays are quite sheltered from all seas from the outside. The mean rise of tide is between 2 feet and 2½ feet. The location is well shown on United States Coast and Geodetic Survey Charts No. 118 and No. 299.

3. The principal industry dependent upon the use of these waters is oyster growing and fishing. Riverhead, the county seat of Suffolk County, on the Peconic River 5 miles west from the head of Great Peconic Bay, receives by water occasional supplies of fuel and building materials, which, however, would not be affected by any improvement in or between the bays, where the depths are more than twice the available depths in Peconic River. Fishing boats and those going through Shinnecock Canal do not require any deepening of the channel in question.

4. Robins Island and much of the south shore of Great Peconic Bay are occupied as summer resorts, several of the owners having yachts which they anchor near their homes. Some of these yachts

are delayed or excluded by insufficient depth in the channel between the two bays, and it was to facilitate this navigation that the examination was asked for. The improvement desired was deepening the channel south of Robins Island, so as to provide free passage for boats of 16 to 18 feet draft.

5. The parties in interest inform me that when they asked for this examination it was under the impression that the project, if approved, would be undertaken and completed during the season of 1912. After they learned that in the usual course of procedure it would be at least one year later and perhaps two they forthwith raised by subscription funds sufficient for the desired work and prepared to begin it in June, 1912. In this they were thwarted by legal proceedings on the part of owners of oyster beds lying in the shallow channel, and an agreement was reached under which, if dredging was deferred until December, 1912, no further opposition would be made. They expect to dredge the channel during the coming winter and spring.

6. There is no present commerce in or through the Peconic Bays which would be benefited by the improvement, and none probable in the future as far as can be foreseen. There are no public or private terminal and transfer facilities contiguous to these waters, nor is there any present need for them. No development or utilization of water power is practicable.

7. The improvement desired is so wholly for the benefit of a small part of the locality and so wholly unrelated to any general commerce or navigation that it ought to be made, if at all, by the persons who want it and at their own expense, in the manner which they now propose.

8. I have, therefore, to report that, in my opinion, the improvement of the channel between Great Peconic Bay and Little Peconic Bay is not a project worthy to be undertaken by the United States, and that no survey or other present action on the part of the Government is recommended.

S. W. ROESSLER,
Colonel, Corps of Engineers.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
New York City, November 7, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

Forwarded, concurring in the views and recommendation of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[For the report of the Board of Engineers for Rivers and Harbors, see p. 2.]

O

62d Congress, } HOUSE OF REPRESENTATIVES. { Document
3d Session. } { No. 1217.

LOCKS NOS. 4 AND 6, MONONGAHELA RIVER, PA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF MONONGAHELA RIVER, PA., WITH A VIEW TO RECONSTRUCTING LOCKS NOS. 4 AND 6.

January 3, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, January 2, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 31st ultimo, together with copies of reports from Lieut. Col. Francis R. Shunk, Corps of Engineers, dated December 4 and 16, 1912, on preliminary examination with plan and estimate of cost of improvement, respectively, of Monongahela River, Pa., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, December 31, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination with plan and estimate of cost of improvement of Monongahela River, Pa.

1. There are submitted herewith, for transmission to Congress, reports dated December 4 and 16, 1912, by Lieut. Col. Francis R. Shunk, Corps of Engineers, on preliminary examination wit plan and estimate of cost of improvement, respectively, of Monongahela

River, Pa., with a view to the reconstruction of Locks and Dams Nos. 4 and 6, called for by the river and harbor act of July 25, 1912.

2. The Monongahela River has been improved by a system of 15 locks and dams. Traffic on the lower river is much heavier than on the upper river, and for this reason different dimensions of locks are required on the upper and lower reaches. Locks 1, 2, 3, and 5 have two chambers, each chamber being 56 feet by 360 feet. The present Lock 4 has two chambers, 50 feet by 158 feet and 56 feet by 227 feet, respectively. The smaller outer lock was completed in 1844 and the larger inside lock was completed in 1886. On account of the heavy traffic on this portion of the river it has been recognized for several years that the reconstruction of this lock so as to provide a chamber of standard dimensions was necessary, and its reconstruction has been recommended in the annual reports of the Chief of Engineers each year for several years. As there was apparently no reason for the reconstruction of the lock except its inadequacy as to size, it was not considered that its reconstruction could be authorized by the Secretary of War under the provisions of section 6 of the river and harbor act approved March 3, 1909, until a careful examination of the lock made in May, 1912, revealed that it had reached a condition where it was extremely dangerous to operate on account of failing walls and other defects which were such as to place the lock in danger of complete collapse at any time. In view of this latter condition and upon the recommendation of the Chief of Engineers, the Secretary of War on July 1, 1912, authorized the reconstruction under the provisions of section 6 of the river and harbor act of March 3, 1909, and made an allotment of $290,000 for the commencement of the work. Under this authority the lock will be reconstructed of standard dimensions and the object sought to be attained by the item under which this report is authorized is thus accomplished for this lock.

3. Lock No. 6 in its present condition has a single chamber 50 feet by 165 feet. The district officer submits two plans for its reconstruction. The first plan contemplates the building of a new chamber of standard dimensions on the outside of the existing chamber and necessary repairs to the dam. The total estimated cost of this plan is $356,400. The second plan contemplates the same work as the first, and in addition the demolition of the old lock and its reconstruction to standard dimensions at a total estimated cost of $557,430, the operating expenses in either case being estimated at $12,000 per annum. The district officer is of opinion that two chambers of standard size are needed to accommodate the commerce which will probably use this lock, but suggests that possibly the facilities that would be afforded by the first plan might be found sufficient for some time to come. For reasons fully given the division engineer recommends the adoption of the first plan.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 23, 1912. The board states that the commerce of Lock 6 in 1911 was reported at 207,543 tons, and while this will no doubt be exceeded with the opening of new coal mines along and above Pool 6, it appears that the prospect of congestion at this lock is not great and that one chamber of standard dimensions, in addition to the old chamber, will reasonably well meet the present and prospective requirements of commerce. For

this reason the board concurs with the division engineer in recommending the reconstruction of Lock 6, under plan 1, at an estimated cost of $356,400.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress I report as follows: That the improvement by the United States of Monongahela River, Pa., with a view to the reconstruction of Locks and Dams Nos. 4 and 6 is deemed advisable. The reconstruction of Lock 4 being already provided for under existing law, it is now recommended that an appropriation of $356,400 be made in one sum at an early date for reconstruction of Lock 6, under plan 1, following in general the methods described in the report of the district officer.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON PLAN AND ESTIMATE OF COST.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

To the Chief of Engineers, United States Army:

1. In the within report the district officer submits two plans for the reconstruction of Lock 6, Monongahela River. The first plan contemplates the building of a new chamber of standard dimensions on the outside of the existing chamber. The lock would then have one chamber of standard dimensions, 56 by 360 feet, and one of lesser dimensions, 50 by 165 feet. The total estimated cost of this plan is $356,400. The second plan contemplates the same work as the first, and in addition the demolition of the old lock and its reconstruction to standard dimensions. The total estimated cost of this plan is $557,430.

2. The district officer is of opinion that two chambers of standard size are needed to accommodate the commerce which will probably use this lock, but suggests that possibly the facilities that would be afforded by plan 1 might be found sufficient for some time to come. The division engineer states that a single lock chamber of standard dimensions would have ample capacity, as long as it remains in commission, for handling all the prospective traffic, at least for several years to come, and for this and other reasons fully explained by him he recommends the adoption of the first plan proposed by the district officer, at an estimated cost of $356,400.

3. The commerce of Monongahela River is mainly coal and amounts to over 10,000,000 tons annually. The greater part of this, however, pertains to the river below Lock No. 6. The commerce of this lock in 1911 was reported at 207,543 tons, and, while this will no doubt be greatly exceeded with the opening of new coal mines along and above Pool 6, it appears that the prospect of congestion of traffic at this lock is not great, and in the opinion of the board one chamber of standard dimensions in addition to the old chamber will reasonably

well meet the present and prospective requirements of commerce. It therefore expresses the opinion that it is advisable for the United States to undertake the reconstruction of Lock 6, Monongahela River, in accordance with plan 1, at an estimated cost of $356,400, the full amount of which should be appropriated in one sum.

4. In compliance with law the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF LOCKS 4 AND 6, MONONGAHELA RIVER, PA.

United States Engineer Office,
Pittsburgh, Pa., December 4, 1912.

From: Lieut. Col. Francis R. Shunk, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Locks 4 and 6, Monongahela River.

1. In compliance with letter of the Chief of Engineers dated August 3, 1912, I submit herewith report of preliminary examination of the Monongahela River, Pa., with a view to the reconstruction of Locks and Dams 4 and 6.

2. The Monongahela River has long been under improvement. It has now a system of 15 locks and dams, providing slack-water navigation for a distance of 131 miles from its mouth. The following table shows the total tonnage at the various locks for the calendar year 1911 (tonnage repeated at the several locks):

At dam—	Total tonnage.		At dam—	Total tonnage.	
	Up.	Down.		Up.	Down.
	Tons.	*Tons.*		*Tons.*	*Tons.*
1	1,338,522	4,340,994	10	31,656	17,713
2	551,716	7,372,857	11	30,480	4,479
3	153,419	8,827,063	12	27,612	2,572
4	163,393	6,841,485	13	27,639	1,992
5	123,939	882,553	14	19,710	3,026
6	115,681	91,862	15	1,738	1,114
7	84,609	11,807			
8	56,390	20,917	Aggregate	2,786,396	28,442,579
9	59,892	22,146			

It will be observed that the traffic on the lower pools is much heavier than on the upper. For this reason different dimensions of locks are contemplated on the lower and upper reaches. The adopted standard for the lower river is a double lock, each chamber 56 feet by 360 feet and a depth of at least 8 feet over the sills; for the upper river a single lock 56 feet by 182 feet and a depth of at least 7 feet over the sills. But it is a question where to draw the line. Locks 1, 2, 3, and 5 conform to the lower river standard and Locks 10 to 15, inclusive, to the upper river standard, leaving Locks 4, 6, 7, 8, and 9 of less dimensions than those contemplated. (A table showing dimensions of all the locks is appended.[1]) The question now to be determined is whether the reconstruction of Locks 4 and 6 is justified.

3. House Document No. 209, Fifty-eighth Congress, second session, Annual Report of Chief of Engineers for 1904, page 2540, contains a report of examination of Lock No. 4, with others, as authorized by the river and harbor act of June 13, 1902. The district officer, the division engineer, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers recommended the reconstruction of the lock and dam. The annual reports of 1905, 1906, 1907, and 1908 call attention to the enlargement of No. 4. The reports of the Chief of Engineers for 1909, 1910, and 1911 (p. 740) make the following recommendation:

> It is very important that this old Lock No. 4, built many years ago with dimensions that are now inadequate for the growing commerce of the river, should be rebuilt at the earliest practicable date, and it is therefore recommended that appropriation and authorization be provided for the amount required to complete this work ($527,000), so that it may be carried on under continuing contract. This amount is larger than the estimate given in House Document No. 209, Fifty-eighth Congress, second session, the increase being necessary because of increased unit costs, etc.

4. The present lock at No. 4 has two chambers, respectively 50 feet by 158 feet and 56 feet by 227 feet, the controlling depth over the sills being for the large lock, upper miter, 9.05 feet, lower miter 6.2 feet; small lock, upper miter (guard), 11.25 feet, lower miter 5.5 feet. As this lock is between two locks of the standard lower river dimensions (56 feet by 360 feet), and since the traffic on the river uses Locks 3 and 5 sometimes to their full capacity, it is obvious that Lock 4 in its present condition is an obstacle to navigation. This would be indicated by study of the traffic above given, and it is also confirmed by observation and the opinion of everyone connected with the river. There is no doubt that, especially in the busy seasons, commerce on the Monongahela River has been seriously handicapped by the inadequacy of this lock, and that there has been financial loss in consequence.

5. In addition to its inadequacy, the condition of the outer lock chamber at No. 4 has become, by undermining due to scour, positively dangerous. For this reason the district officer, under date of May 31, 1912, made report calling attention to the dangerous condition of this lock and recommended that the entire lock and dam be reconstructed. Under the provisions of the act approved March 3, 1909, an allotment of $290,000 was made by the Secretary of War July 1, 1912, for beginning the work. It was expected that the entire work would be done under similar allotments. It may be, however, that the act of Congress directing the present examination contemplates the completion of the work by specific appropriation. I therefore recommend that the reconstruction of Lock and Dam No. 4 is urgently necessary and is well worthy of being done by the United States. No further survey will be required, as a detailed estimate has already been submitted, May 31, 1912.

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[1] Not printed.

6. Lock No. 6 in its present condition has a single chamber 50 feet by 165 feet and a ruling depth over sills of 6.2 feet. The following table exhibits the downstream coal traffic, the principal item of commerce at Locks 5 and 6 during the past six years:

Year.	No. 5.	No. 6.	Year.	No. 5.	No. 6.
	Tons.	*Tons.*		*Tons.*	*Tons.*
1907	865,720	182,760	1910	1,335,932	314,280
1908	694,856	280,180	1911	869,980	81,864
1909	714,780	224,740	1912 (estimated)	1,220,386	12,000

The drop in 1911 and 1912 was caused by the cessation of river coal traffic from the Gates mines.

It might appear from this table that the dividing line between the lower-river standard lock and the upper-river standard lock should be drawn between Locks 5 and 6, and that a chamber conforming to the upper-river standard would be sufficient for No. 6. It is a fact, however, that during the past two years the Crucible Steel Co. of America has erected one of the largest steel and concrete coal tipples on the western rivers, a short distance above Lock No. 6, and is now building a large fleet of special steel boats to ship coal from their mines along the pool above No. 6 to their plant at Midland, about 40 miles below Pittsburgh, on the Ohio. The business to be done is estimated at fully 1,000,000 tons of coal annually by boat from the sixth pool. It is not my opinion that Lock No. 6 in its present condition is adequate for the needs of this increased commerce, which is not at all hypothetical, but a certain thing. The lock should certainly be at least as large as the upper-river standard, so that its immediate reconstruction is to be recommended. But I think that the interests of commerce undoubtedly require two chambers of dimensions equal to those on the lower river. I therefore recommend that the reconstruction of Lock and Dam No. 6 in conformity with the lower-river standard is justified and that the work is well worthy of being done by the United States. No further survey will be necessary, as an estimate has already been prepared in this office.

7. As the Monongahela River is already under improvement and as the proposed improvement is of the nature of rebuilding works already in existence, a number of the points usually covered in the preliminary examination do not appear to require mention. The water levels in the various pools are governed by the existing dams and are shown in the appended table.[1] Description of the river is found in the Annual Report of the Chief of Engineers for 1911.

8. No questions of water power or public wharves appear to call for consideration.

9. Bridges of controlling dimensions on the Monongahela River are as follows:

Port Perry Bridge, Pennsylvania Railroad, 11.7 miles above Pittsburgh, span 409 feet, height above normal pool level 49.1 feet.

Pittsburgh & Lake Erie Railroad bridge, 8.6 miles above Pittsburgh, span 268 feet, height above normal pool level 54 feet.

Pennsylvania Railroad bridge, 55.4 miles above Pittsburgh, span 262 feet, height above normal pool level 42.7 feet.

Baltimore & Ohio Railroad bridge, 124 miles above Pittsburgh, span 56 feet, height above normal pool level 50 feet.

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[1] Not printed.

10. The fluctuations of the water surface at Locks Nos. 4 and 6 are as follows:

Lock No. 4, maximum 24.8 feet above crest of dam.
Lock No. 4, minimum 1.25 feet below crest of dam.
Lock No. 6, maximum 26 feet above crest of dam.
Lock No. 6, minimum 0.

11. The draft of boats on the Monongahela River varies with the stage of the river, the boats being loaded heavy or light as the water is high or low. The minimum depths are now at Lock No. 4. The small chamber will accommodate boats drawing 5.2 feet and the large chamber boats drawing 5.6 feet.

FRANCIS R. SHUNK.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
December 7, 1912.

To the CHIEF OF ENGINEERS:

1. I concur in the views of the district officer that it is advisable for the United States to rebuild both of these locks and dams. It is understood, however, that the reconstruction of No. 4 has already been authorized by the Secretary of War under the provisions of section 6 of the river and harbor act approved March 3, 1909, so that a special appropriation is not required for this work.

2. It is recommended that an estimate for No. 6 be authorized.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 9, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

For reasons stated herein, the board concurs with the district officer and the division engineer in recommending a survey in order to determine the extent and advisability of the improvement. It is requested that estimates be given both for a single chamber and for a double chamber of standard dimensions for the new lock at No. 6, and that the district officer discuss the relative advantages of the two plans.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PLAN AND ESTIMATE OF COST OF RECONSTRUCTING LOCK 6, MONONGAHELA RIVER, PA.

War Department,
United States Engineer Office,
Pittsburgh, Pa., December 16, 1912.

From: Lieut. Col. Francis R. Shunk, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer, Central Division).
Subject: Plan and estimate for reconstructing Lock 6, Monongahela River.

1. In compliance with letter of the Chief of Engineers, of December 10, 1912, estimate is submitted for the reconstruction of Lock 6, Monongahela River.

2. No survey was needed for the preparation of this estimate, as all needed information was already on file in this office. Two plans have been considered and estimates submitted for each.

3. The first plan contemplates the building of a new chamber of standard dimensions for the lower river on the outside of the existing chamber. As the length of dam appears to be sufficient there would be no special advantage in removing the old lock chamber which would, therefore, be retained and Lock 6 would then have one chamber of standard dimensions and one of less dimensions, viz, 56 by 360 feet and 50 by 165 feet. Estimate for this plan is as follows:

A. Preliminary work:		
1. New construction plant	$15,000	
2. Construction office, tool house, and cement shed	1,000	
3. Dredging foundation for coffer, 5 days, at $100 per day	500	
		$16,500
B. Cofferdam:		
1. Coffer in place, complete, 1,150 linear feet at $15 per linear foot	17,250	
2. Protection fenders, 2, at $750 each	1,500	
3. Pumping, 9 months, at $500 per month	4,500	
		23,250
C. Excavation, rock, 2,500 cubic yards, at $2 per cubic yard		5,000
D. Removing old dam, 3,700 cubic yards, at $2 per cubic yard		7,400
E. New outer lock:		
1. Upper guard wall crib foundation, 260 linear feet, at $25 per linear foot	$6,500	
2. Concrete, including complete middle wall for ultimate double lock, 17,500 cubic yards, at $5.50 per cubic yard	96,250	
3. Lock gates, 4 leaves, at $3,000 each, in place	12,000	
4. Valves, cylindrical, 5, at $600 each	3,000	
5. Valves, butterfly, 1, at $500	500	
6. Gate valve machinery, 4 sets, at $200 per set	800	
7. Gate machinery, 4 sets, at $750 per set	3,000	
8. Valve machinery, 6 sets, at $300 per set	1,800	
9. Screens, 5, at $100 each	500	
10. Installing machinery and piping	2,000	
11. Power plant	12,000	
		138,350
F. Removing cofferdam, 1,150 linear feet, at $5 per linear foot		5,750
G. Running expenses of plant, 12 months, at $500 per month		6,000
H. Engineering and superintendence, 12 months, at $1,200 per month		14,400
I. General labor, not included in other items, 12 months, at $550 per month		6,600
Total		223,250
Contingencies, 20 per cent		44,650
Grand total		267,900

4. The second plan contemplates the same work as the first and in addition the demolition of the old lock and its reconstruction to standard dimensions. The estimate for this work is as follows:

A. Preliminary work:		
1. New construction plant	$15,000	
2. Construction office, tool house, and cement shed	1,000	
3. Dredging foundation for coffer, 5 days, at $100 per day.	500	
		$16,500
B. Cofferdam:		
1. Coffer in place, complete, 1,150 linear feet, at $15 per linear foot	17,250	
2. Protection fenders, 2 at $750 each	1,500	
3. Pumping, 9 months, at $500 per month	4,500	
		23,250
C. Excavation, rock, 2,500 cubic yards, at $2 per cubic yard		5,000
D. Removing old dam, 3,700 cubic yards, at $2 per cubic yard		7,400
E. New outer lock:		
1. Upper guard wall crib foundation, 260 linear feet, at $25 per linear foot	$6,500	
2. Concrete, including complete middle wall for ultimate double lock, 17,500 cubic yards, at $5.50 per cubic yard	96,250	
3. Lock gates, 4 leaves, at $3,000 each, in place	12,000	
4. Valves, cylindrical, 5 at $600 each	3,000	
5. Valves, butterfly, 1 at $500	500	
6. Gate valve machinery, 4 sets, at $200 per set	800	
7. Gate machinery, 4 sets, at $750 per set	3,000	
8. Valve machinery, 6 sets, at $300 per set	1,800	
9. Screens, 5 at $100 each	500	
10. Installing machinery and piping	2,000	
		126,350
F. Removing cofferdam, 1,150 linear feet, at $5 per linear foot		5,750
G. Running expenses of plant, 12 months, at $500 per month		6,000
H. Engineering and superintendence, 12 months, at $1,200 per month		14,400
I. General labor, not included in other items, 12 months, at $550 per month		6,600
Total		211,250
Contingencies, 20 per cent		42,250
Grand total		253,500
A. Scraping foundation for cofferdam, 2 days, at $100 per day		200
B. Cofferdam:		
1. Coffer in place, complete, 250 linear feet, at $6 per linear foot	$1,500	
2. Pumping, 6 months, at $500 per month	3,000	
		4,500
C. Removing river wall of old lock:		
1. Masonry, 4,100 cubic yards, at $2 per cubic yard	8,200	
2. Upper guard wall crib foundation, 130 linear feet, at $10 per linear foot	1,300	
		9,500
D. w inner lock:		
1. Concrete, 13,050 cubic yards, at $5.50 per cubic yard	71,775	
2. Upper and lower guide wall crib foundations, 940 linear feet, at $25 per linear foot	23,500	
3. Lock gates, 4 leaves, in place, at $3,000 each	12,000	
4. Valves, cylindrical, 4, at $600 each	2,400	
5. Valves, butterfly, 1, at $500	500	
6. Gate valve machinery, 4 sets, at $200 per set	800	
7. Gate machinery, 4 sets, at $750 per set	3,000	
8. Valve machinery, 5 sets, at $300 per set	1,500	
9. Screens, 5, at $100 each	500	
10. Installing machinery and piping	2,000	
		117,975

E. Power plant:		
1. One water turbine, 1 air compressor	$4,000	
2. One boiler, 1 air compressor	4,000	
3. Two air receivers, at $200 each	400	
4. One cooling tank	100	
5. Two circulating pumps, at $100 each	200	
6. Piping and fitting	400	
7. Building	8,000	
8. Electric-light set	2,000	
		$19,100
F. Removing cofferdam, 250 linear feet, at $5 per linear foot		1,250
G. Running expenses of plant, 12 months, at $500 per month		6,000
H. Engineering and superintendence, 12 months, at $1,200 per month		14,400
I. General labor, not included in other items, 12 months, at $550 per month		6,600
Total		179,525
Contingencies, 20 per cent		35,905
Grand total		215,430
Dam, new concrete top with movable weir on old crib foundation, 510 linear feet, at $125 per linear foot		63,750
Contingencies, 20 per cent		12,750
Lock dwellings, 2, at $6,000 each		12,000

SUMMARY.

First plan, single chamber:			
1. Outer lock only	$223,250		
20 per cent contingencies	44,650		
		$267,900	
2. Dam	63,750		
20 per cent contingencies	12,750		
		76,500	
3. Lock dwellings		12,000	
			356,400
Second plan, double chamber:			
1. Outer lock	211,250		
20 per cent contingencies	42,250		
		253,500	
2. Inner lock, including power plant	179,525		
20 per cent contingencies	35,905		
		215,430	
3. Dam	63,750		
20 per cent contingencies	12,750		
		76,500	
4. Lock dwellings		12,000	
			557,430

5. If it were desired to reduce this lock to a single chamber it would be necessary after building a new chamber to demolish the present one and substitute a short length of dam. As there would be no advantage in incurring this extra expense and as the resulting structure would be less commodious than if the present chamber were left, I suppose that no one would recommend a reduction of the latter to a single chamber. The advantage of building two new chambers of standard dimensions is that commerce such as is to be expected will be better accommodated by two chambers of full size than by one large and one small chamber. It is probable that in the future the increase to the full double-chamber standard would be demanded and the cost of doing the additional work at a later time would be considerably greater, as involving a second collecting and assembling of plant and the expense of two jobs of preliminary work and final clearing up. The advantage of building a single new lock is that the immediate cost would be less, and it may be that this arrangement will suit the needs of commerce for a considerable time.

6. I am of opinion, however, that two chambers of standard size are needed. There is, as set forth in the report of preliminary examination, good prospect of a large increase of traffic through this lock. The principal item of commerce, viz, coal, from the adjacent mines, is transported in tows, and the dimensions of the barges and tows are governed by the size of the lock chamber. It would be very inconvenient and, I think, an undue impediment to navigation to arrange the locks so the standard tow could use only one chamber. Certainly the smaller chamber would then always be available for single boats and perhaps for such smaller tows as might occasionally come along, but in view of the probable increase of traffic and the certain increase of cost should the enlargement of the whole chamber be postponed, I am of the opinion that it would be better to proceed at once to build two standard chambers. No additional facts have been learned which would cause any modification of former statements.

7. In case the project were adopted by Congress the first appropriation ought to be $356,400, and the remainder of the estimate should be appropriated the following year, as it is believed that the lock and dam might be completed within 18 months.

8. The cost of maintenance, including operating expenses, will be approximately $12,000 a year. It is supposed that this will be provided for from the annual allotment for operating and care.

FRANCIS R. SHUNK.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
December 18, 1912.

To the CHIEF OF ENGINEERS:

A single-lock chamber of standard dimensions would have ample capacity, as long as it remains in commission, for handling all the prospective traffic, at least for several years to come. If it should become disabled in any way and would have to be closed for repairs, there would be a blockade of such traffic as could not pass through the old lock chamber. It is understood that the principal prospective shipper from the sixth pool proposes to build barges 200 feet long, which could not use the old lock. In other words, the provision of a second lock chamber of standard dimensions can hardly be justified except as a matter of insurance to provide against occasional interruptions that may occur with a single chamber of standard size. When the traffic becomes very heavy such a method of insurance would doubtless be warranted, and a second full-sized chamber may become essential to properly safeguard navigation at this place. It is believed, however, that under the present conditions and those immediately prospective it would be furnishing reasonable facilities for navigation to provide a single chamber of standard dimensions in addition to the present old chamber, and the first plan proposed by the district officer is therefore recommended for approval at an estimated cost of $356,400.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1219.

DUWAMISH RIVER, WASH.

LETTER

FROM

THE SECRETARY OF WAR.

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF DUWAMISH RIVER, WASH.

January 4, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, January 3, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 2d instant, together with copy of a report from Capt. Arthur Williams, Corps of Engineers, dated December 3, 1910, on preliminary examination of Duwamish River, Wash., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, January 2, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Duwamish River, Wash.

1. There is submitted herewith, for transmission to Congress, report dated December 3, 1910, by Capt. Arthur Williams, Corps of Engineers, on preliminary examination of Duwamish River, Wash., authorized by the river and harbor act approved June 25, 1910.

2. Duwamish River, formed by the junction of the Black and Green Rivers, is very tortuous, the length from source to mouth along the channel being 16 miles; in a straight line the distance is only 8 miles. The improvement desired is the straightening and deepening of the river for the purpose of increasing its drainage capacity and preventing floods. It appears, however, that recent changes and improvements now contemplated will reduce the drainage area of the river so that the evil effects of floods should be much less than in former years. The district officer is of opinion, concurred in by the division engineer, since no material benefit could be expected from any other than a very radical improvement at a cost disproportionate to the amount of present and reasonably prospective commerce, that Duwamish River is not worthy of improvement by the General Government.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated February 27, 1911, concurring in the opinion of the district officer and the division engineer.

4. The submission of this report has been delayed to allow time for further information as to certain improvements contemplated by the State in this vicinity; but reports of November 30, 1912, from the district engineer officer indicate that no substantial physical changes have occurred at this place during 1911 and 1912 sufficient to justify further delay in final report.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Duwamish River, Wash., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, February 27, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The Duwamish River, formed by the junction of the Black and Green Rivers, flows northward into east and west waterways in Seattle Harbor. Its length, following its tortuous course, is about 16 miles, while in a straight line from source to mouth it is 8 miles. The average range of tide varies from 9 feet at the mouth to 1 foot at the source of the river. The depth of channel at high tide is about 12 feet for 8 miles from the mouth and then diminishes to as little as 2.5 feet. The river has been subject to violent floods which have inundated the adjacent bottom lands and for a long period the inhabitants of the valley have desired that the river be straight-

ened and deepened for the purpose of increasing its drainage capacity and preventing overflow.

3. As a result of a flood in 1906 the flow of the White River, the principal tributary of the Duwamish River, was diverted to the Puyallup, which discharges into Puget Sound at Tacoma, thereby reducing the drainage area 766 square miles. This will be still further reduced when the Cedar River is cut off as proposed in connection with the project for the construction of the Lake Washington Canal. It will be seen, therefore, that the evil effects of floods should be much less than in former years.

4. From a study of physical conditions, it seems clear that no material benefit could be expected from any other than a very radical improvement of this stream, involving great cost as indicated in a report of survey published in House Document 590, Fifty-ninth Congress, first session, to which attention is invited. The present commerce is not large or valuable and the district officer states that the advocates of the improvement do not claim that existing commerce justifies the necessary expenditure, but that the improvement would attract factories and other industries and create a commerce which would make the river an important waterway. The district officer expresses the opinion, in which the division engineer concurs, that the improvement is not worthy of being undertaken by the General Government.

5. While the improvement desired would be of local benefit and a valuable asset to the city of Seattle, it is not believed to be of sufficient importance to general commerce and navigation to justify the United States in undertaking the work. The board therefore concurs in the opinion of the district officer and the division engineer that Duwamish River is not worthy of improvement by the General Government.

6. The district officer states that wharves are located on the Duwamish River at Georgetown, a suburb of Seattle, which are adequate for the present needs of traffic and that landings are made at suitable places along the bank as required. In compliance with law, the board reports that there are no questions of water power or other subjects so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF DUWAMISH RIVER, WASH.

United States Engineer Office,
Seattle, Wash., December 3, 1910.

Sir: 1. In compliance with department letter of August 4, 1910, I have the honor to report upon a preliminary examination of Duwamish River, Wash., as directed in the river and harbor bill approved June 25, 1910.

2. The examination was made under my direction on November 1, 1910, by First Lieut. Jos. H. Earle, Corps of Engineers, and Asst.

Engineer J. M. Clapp. A public hearing, which had been well advertised and at which interested parties were present or represented, was held by me in this office on November 5, 1910. This river has been the subject of examinations and surveys with a view to its proposed improvement twice in former years, and at both times was considered by the department to be unworthy of improvement by the United States. Reports of the district officers on these examinations and surveys were published in the Annual Report of the Chief of Engineers for 1898, part 4, pages 3103–3112, and in House Document No. 590, Fifty-ninth Congress, first session.

3. The Duwamish River is formed by the junction of the Black and Green Rivers near the southern end of Lake Washington and about 8 miles south of the center of Seattle. It flows northward into the east and west waterways in Seattle Harbor. It is very tortuous, the distance from source to mouth being about 16 miles along the channel and 8 miles in a straight line. For 8 miles above the mouth the channel has ruling depths at high tide of about 12 feet, in the next 4 miles depths rapidly decrease, and in the remaining 4 miles the ruling depths at high tide are about 2½ feet. The average range of tide in the waterways at the mouth of the stream is about 9 feet. When the river is low the tidal effect is about 1 foot at the junction of Black and Green Rivers, but in high stages of the river the tidal effect is not felt at that point. The river is subject to floods in spring and fall of each year, and frequently the adjacent lands are inundated. Violent floods which caused great damage have occurred at intervals of several years. The last of these was in November, 1906. Prior to that time the White River was the principal tributary of the Duwamish; but one result of the 1906 flood was a change in direction of flow of White River, causing it to empty into Puyallup River, which discharges into Puget Sound at Tacoma. The resulting decrease in the drainage area of the Duwamish was 867 square miles, leaving the present drainage area of this stream 766 square miles. This will be still further reduced by the elimination of the area drained by the Cedar River when that stream shall be diverted into Lake Washington as provided for in the project for the construction of the Lake Washington Canal; 586 square miles will then constitute the drainage basin of the Duwamish.

The low-water flow of this stream is about 100 cubic feet per second, the flood flow observed in November, 1906, being about 20,000 cubic feet per second.

4. Prior to the construction of railways through the Duwamish Valley the river was regularly navigated by flat-bottomed boats carrying farm produce and supplies to and from Seattle. The amount of this traffic reached a maximum in about 1890, since which time it has greatly decreased, due to the substitution of railway for water transportation. The value of commerce using the Duwamish in the calendar year 1909 was as follows:

Brick	$100,000
Coal	12,000
Shingles	4,000
Logs	90,000
Piles and poles	8,000
Miscellaneous	10,000
Total, about 30,000 tons	224,000

The volume of commerce has changed very little since 1897.

5. For a long period the inhabitants of the Duwamish Valley have desired that the river be straightened and deepened for the purpose of increasing its drainage capacity and preventing floods. The waterfront of Seattle Harbor has been rapidly occupied there is now some congestion directly in front of the city. To remedy this the civic plans commission is now preparing plans for certain changes in the harbor. It is expected that the proposed Lake Washington Canal will largely assist in relieving congestion. During the past year a commercial waterway district has been organized for the purpose of constructing a waterway about 4 miles into the Duwamish Valley. About 10,000 acres of land is included in this district from which it is expected to raise $900,000 by assessment. With this sum the excavation of a channel 150 feet wide 16 feet deep at extreme low tide and about 4 miles long is contemplated. The right of way will be purchased by King County, the issue of $600,000 in bonds for the purchase of this right of way having been authorized by vote at a recent election.

6. All of the railways entering Seattle have lines which extend through the Duwamish Valley. These railways are the Northern Pacific, the Great Northern, the Union Pacific System, the Chicago, Milwaukee & Puget Sound, and the Columbia River & Puget Sound. Wharves are located on the Duwamish at Georgetown, a suburb of Seattle, which are adequate for the present needs of traffic between Georgetown and Seattle. Landings are made at suitable places along the banks as traffic requires. The river is tidal throughout its length, and the average fall of the valley is about 2 feet per mile. The banks are low and the waterpower development is impracticable.

7. Destructive floods have occurred at intervals of about five years, and considerable portions of the valley have been inundated at times of floods in the spring and fall of each year. The elimination, already accomplished, of the waters of the White River, has done much to relieve flood conditions, and the proposed diversion of the Cedar River into Lake Washington, in connection with the construction of the proposed Lake Washington Canal, will give further relief.

8. The advocates of the improvement do not claim that the present commerce of the valley justifies the necessary expenditure or that a great commerce is in prospect. But their idea is that the construction of a first-class waterway would attract factories and other industries and thus create a commerce which would make the river an important waterway. This would place the United States in the position of improving a river to create a traffic instead of to accommodate commerce already existing.

9. I am therefore of opinion that Duwamish River is not worthy of improvement by the United States and recommend that no appropriation be made for such purpose.

Very respectfully,

ARTHUR WILLIAMS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the division engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., December 8, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer.

CHAS. E. L. B. DAVIS,
Brigadier General, United States Army,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1220.

WEST FORK, SOUTH BRANCH, CHICAGO RIVER, ILL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF WEST FORK, SOUTH BRANCH, CHICAGO RIVER, ILL., FROM ROBEY STREET WEST TO FORTY-EIGHTH AVENUE, WITH A VIEW TO SECURING A CHANNEL 21 FEET DEEP AND 175 FEET WIDE, EXCEPT THROUGH ROCK CUTTING IT SHALL BE 100 FEET WIDE.

JANUARY 4, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 3, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 23d ultimo, together with copy of a report from Maj. Chas. S. Bromwell, Corps of Engineers, dated October 27, 1910, on preliminary examination of West Fork, South Branch, Chicago River, Ill., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 23, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of West Fork, South Branch, Chicago River, Ill.

1. There is submitted herewith, for transmission to Congress, report dated October 27, 1910, by Maj. Chas. S. Bromwell, Corps of

Engineers, on preliminary examination authorized by the following provision of the river and harbor act approved June 25, 1910:

> West Branch, South Fork, Chicago River [Illinois], from Robey Street west to Forty-eighth Avenue, with a view to securing a channel twenty-one feet deep and one hundred and seventy-five feet wide, except through rock cutting it shall be one hundred feet wide.

2. To conform with former reports and with adopted local designations, the expression "West Branch, South Fork," should be changed to "West Fork, South Branch." This locality lies about 8 miles from the lake harbor and 25 bridges must be passed in order to reach it. It has never been improved by the United States, but that portion between Ashland Avenue and Robey Street has been deepened to 21 feet with a general width of 200 feet by the Sanitary District of Chicago as a portion of the drainage canal, and a channel depth of 12 feet and 80 feet wide now exists from Robey Street to Kedzie Avenue, and of about 5 feet depth and 100 feet wide thence to Lawndale Avenue, decreasing gradually to Forty-eighth Avenue where the width and depth are only 65 feet and 3 feet, respectively. About 700 feet east of Kedzie Avenue a collateral channel constructed by the sanitary district connects this fork with the drainage canal, which runs generally parallel with the West Fork at a distance of about 2,000 feet.

3. The desire for improvement of this fork is probably to provide for the commerce of Chicago so as to give suitable sites for industrial and manufacturing establishments accessible to water transportation, but there does not seem to be any unanimity of desire for any certain improvement and, indeed, in some quarters the idea of any improvement meets with strong opposition. On account of the existence of the drainage canal, which now forms a through waterway of ample size just 2,000 feet away, on which there are ample sites available for industrial establishments now unoccupied, of the large cost of improvement which would be incommensurate with resulting benefits to the general public, and for other reasons fully stated in his report, the district officer is of opinion that the improvement of this fork, which is not a through waterway, is not worthy of being undertaken at the expense of the General Government, and this opinion is concurred in by the division engineer.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated January 9, 1912. At the request of local interests the board visited the locality and held a public hearing attended by a large number of persons, and all who desired were given an opportunity to be heard, whether in favor of or in opposition to the improvement. In concluding its review of this case, the board states:

> The question of the improvement of this stream in part has been reported by the board on two occasions in recent years, in both instances unfavorably. In the opinion of the board there is nothing in the present situation to change its views, and it therefore concurs with the district officer and division engineer in believing that it is not advisable for the United States to undertake the improvement of the West Fork of the South Branch of the Chicago River from Robey Street to Forty-eighth Avenue.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the

improvement by the United States of the West Fork of the South Branch of the Chicago River from Robey Street to Forty-eighth Avenue, Chicago, Ill., to the extent described in the act is not deemed advisable at the present time. Attention is invited, however, to the views of the district engineer (last paragraph of his report) as to a possible cooperation or other arrangement by which some improvement might be given at cost to the United States proportionate to the public benefit.

W. H. Bixby,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, January 9, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

This is an examination of the West Fork of the South Branch of the Chicago River from Robey Street to Forty-eighth Avenue, a distance of about 4 miles, "with a view to securing a channel 21 feet deep and 175 feet wide, except through rock cutting it shall be 100 feet wide." From Robey Street to Kedzie Avenue, 1⅜ miles, there is an available channel about 12 feet in depth and 80 feet in width, the river width being about 175 feet. From Kedzie Avenue to Lawndale Avenue, five-eighths of a mile, the width of the fork is about 100 feet, with an available depth of about 5 feet, and from Lawndale to the western limit under examination the width is about 65 feet and the depth decreases to about 3 feet. A collateral channel connects the sanitary canal with the West Fork at a point about 700 feet east of Kedzie Avenue. Four drawbridges cross the fork east of Kedzie Avenue and eight fixed bridges cross it west of that avenue. This locality lies about 8 miles from the lake harbor, and 25 bridges must be passed in order to reach it.

A number of railroad corporations are opposed to the improvement, as it would involve them in large expense for the construction of movable bridges and would necessitate the maintenance of draws over this stream at a point only about 2,000 feet from the bridges over the sanitary canal. One large industrial corporation is also opposed to the improvement, but other interests, including commercial organizations, the city of Chicago, industrial concerns, and private landowners generally favor it. For reasons given, the district officer expresses the opinion, in which the division engineer concurs, that the improvement is not advisable at the expense of the United States.

4. At the request of local interests the board visited the locality and held a public hearing in Chicago September 20, 1911, which was attended by a large number of persons. All who desired were given an opportunity to be heard, whether in favor of or in opposition to the improvement. In reply to a statement made at the hearing that this is not a navigable waterway, Mr. Edward T. Cahill prepared and has

presented to the board an elaborate and interesting discussion[1] of this phase of the subject, taking up the history of the stream from the date of its first use by the early pioneers, and concluding from the argument and testimony presented that this is a navigable waterway in fact and in law, and as such should be improved. The board is not inclined to question the navigable status of this waterway, but the simple fact of a stream being navigable in law does not carry with it any obligation on the part of the United States to provide improved navigation facilities. The justification for improvement must be based upon the necessities therefor, in the interests of general commerce as affecting the public at large, and upon the relation between probable benefits and the cost of securing them.

5. In the case in hand there is a commodious waterway paralleling the one under consideration and distant therefrom but 1,500 to 2,000 feet, capable of carrying a much larger commerce than will probably seek water transportation from this locality in the near future. The unoccupied areas adjacent to this improved waterway, created by the sanitary district of Chicago, are as well suited for development as those located on the banks of the West Fork, and no more benefit can be reasonably expected from the improvement of the West Fork than should come from the presence of the existing commodious waterway, except perhaps certain immediate benefits to those concerns already located on the West Fork and to the owners of similarly located unimproved property. Whether a large commerce would develop from the proposed improvement is more or less conjectural, but one thing seems certain, and that is that the arguments in the affirmative of such a development should apply with equal force to the existing waterway if the question is considered from the broad standpoint of general commerce freed from the limitations of local interests, and it does not seem to the board that it is the duty of the United States to expend large sums in affording an additional highway for the development of commerce that can be made tributary to an adequate waterway now available and but 2,000 feet distant. It is stated that the development of the West Fork would provide an additional 8 miles of dock frontage. The banks of the sanitary canal are available for a more extensive development.

6. The question of the improvement of this stream in part has been reported upon by the board on two occasions in recent years, in both instances unfavorably. In the opinon of the board there is nothing in the present situation to change its views, and it therefore concurs with the district officer and division engineer in believing that it is not advisable for the United States to undertake the improvement of the West Fork of the South Branch of the Chicago River from Robey Street to Forty-eighth Avenue.

7. There are no questions of terminal facilities, waterpower, or other subjects so related to the improvement desired as to render it advisable in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

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[1] Not printed.

PRELIMINARY EXAMINATION OF WEST FORK, SOUTH BRANCH, OF CHICAGO RIVER, ILL.

UNITED STATES ENGINEER OFFICE,
Chicago, Ill., October 27, 1910.

SIR: I have the honor to submit the following report on preliminary examination made in pursuance of a provision in the act of Congress approved June 25, 1910, as follows:

> West Branch, South Fork, Chicago River, from Robey Street west to Forty-eighth Avenue, with a view to securing a channel twenty-one feet deep and one hundred and seventy-five feet wide, except through rock cutting it shall be one hundred feet wide.

2. The expression "West Branch, South Fork," as used in the act, should, to conform to the generally adopted local designations and former reports, be changed to "West Fork, South Branch."

3. A part of the stream outlined in the act, to wit, from Robey Street to Kedzie Avenue, about 1⅝ miles, was surveyed in 1905 and reported under date of December 12, 1905 (printed in H. Doc. No. 700, 59th Cong., 1st sess.). A report on the preliminary examination of the West Fork was made under date of July 7, 1905 (printed in the same H. Doc.). Another preliminary examination of the West Fork to Sacramento Avenue was reported on under date of May 28, 1909 (printed in H. Doc. No. 392, 61st Cong., 2d sess.).

4. The West Fork and the South Fork unite at Ashland Avenue and Fuller Street to form the South Branch of the Chicago River. The West Fork extends from its junction with the South Fork generally westward to the city limits at Forty-sixth Street. The so-called Ogden Ditch connects the Desplaines River with the West Fork at the city limits.

5. The drainage canal utilizes the lower 3,500 feet of the West Fork as a channel and at Robey Street branches off from the West Fork and runs generally parallel to it at a distance of about 2,000 feet. The distances measured along the West Fork are approximately as follows:

From South Branch of the Chicago River at Ashland Avenue to drainage canal at Robey Street, two-thirds mile.
From Robey Street to Kedzie Avenue, 1⅝ miles.
From Kedzie Avenue to Lawndale Avenue, five-eighths mile.
From Lawndale Avenue to Forty-sixth Avenue—city limits—1⅜ miles.
From Forty-sixth Avenue to Forty-eighth Avenue, one-fourth mile.

6. The South Fork has been dredged by the United States to a depth of 21 feet, and a turning basin has been formed at the junction of the two forks. No work of improvement has been done by the United States in the West Fork, but the portion of it between Ashland Avenue and Robey Street has been deepened to 21 feet with a general width of 200 feet by the Sanitary District of Chicago as a portion of the drainage canal and its maintenance will be cared for by the sanitary district.

7. Original depths in the West Fork from Robey Street to Kedzie Avenue run from 9 to 12 feet. When the drainage canal was opened the hydraulic grade in the West Fork was lowered about 2 feet, but the sanitary district restored the original depths by excavating to a depth of 12 feet with a width of 80 feet.

8. Between Kedzie and Lawndale Avenues the river is about 100 feet in width, with an average depth of about 5 feet. Above

Lawndale Avenue the channel is about 65 feet in width, with depths decreasing gradually to Forty-eighth Avenue, where the depth was found to be only 3 feet. At a point about 700 feet east of Kedzie Avenue, near Sacramento Avenue, a collateral channel constructed by the sanitary district connects the West Fork with the drainage canal.

9. There are four drawbridges crossing the West Fork between Ashland and Kedzie Avenues, with clear openings in the draw from 50 to 60 feet. From Kedzie Avenue to Forty-eighth Avenue there are 8 fixed trestle bridges.

10. The portion of the West Fork between Robey Street and Kedzie Avenue has a water frontage of about 8,760 feet on each side. Of this the International Harvester Co. occupies 3,700 feet on the north bank and 3,400 feet on the south bank; Kimball Piano Co., 800 feet on north bank; city of Chicago, 1,450 feet on north bank; Barrett Manufacturing Co., 800 feet on the north bank; Fitzpatrick Soap Co., 400 feet on south bank; Maxwell Bros., 1,800 feet on south bank; and the remainder is occupied by smaller holders, streets, boulevards, and railroad rights of way. The larger owners have large manufacturing establishments and storage yards and have more or less of their water front docked for their uses. West of Kedzie Avenue the frontage is held by a larger number of holders, the largest being the People's Gas Light & Coke Co., having a frontage on each side of the stream of about 2,900 feet, but their properties are unimproved with the exception of the plant of the Liquid-Carbonic Co., recently completed, just west of Kedzie Avenue.

11. As stated before, no work of improvement has been done in the West Fork by the United States, and no channel, harbor, or dock lines have been established.

12. Correspondence was had with the various commercial bodies of Chicago, as well as with the owners and the railroad interests involved. Answers were received from nearly all of the parties concerned and copies[1] of these replies accompany this report. From a consideration of these replies it appears that as a rule the railroad interests are earnestly opposed to this improvement on account of the large expenditures involved in changing their fixed bridges to drawbridges, and increasing dimensions of existing drawbridges, and on account of the increased difficulties and dangers in handling their traffic, both freight and passenger, due to existing drawbridges over the drainage canal only 2,000 feet away. The International Harvester Co. is opposed to the improvement and would prefer to have the fork declared nonnavigable, so that it might be closed entirely; but it must be noted that they have good access to the drainage canal for shipping facilities.

13. The other interests who have plants established and doing business are in general in favor of the improvement. The city of Chicago is in favor of the improvement as it will permit the establishment of certain industries for the prisoners at Bridewell. The various commercial organizations are in favor of the improvement. The owners of properties which have not yet been developed are unanimously in favor of the improvement on account of the fact

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[1] Not printed.

that such improvement will render available their holdings as sites for industrial establishments.

14. The following is a summary of the views of the principal owners and interests affected:

National Business League of America	Yes.
James H. Gore	No.
Chicago, Burlington & Quincy Railroad	Indifferent.
Western Electric Co	Yes.
International Harvester Co	No.
Illinois Northern Railroad	No.
Henry H. Walker & Co	Yes.
Lumbermen's Association	Yes.
E. A. Woods, Frazier estates, Goff estate	Yes.
Brown estate	Yes.
Pennsylvania Railroad lines	No.
Hines Lumber Co	Yes.
City of Chicago	Yes.
Chicago Real Estate Board	Yes.
Liquid-Carbonic Co	Yes.
Chicago Association of Commerce	Yes.
Barrett Manufacturing Co	Yes.
The Newberry Library	Yes.
Frank C. Osburn	Yes.
Chicago River & Harbor Association	Yes.
Chicago & Western Indiana Railroad	No.
Belt Railway Co. of Chicago	No.
The Illinois Central Railroad	No.
Baltimore & Ohio Railroad	No.
Morton Salt Co	Yes.
W. W. Kimball Co	Yes.
Maxwell Brothers Co	Yes.
People's Gas Light & Coke Co	Yes.

15. If this stream were improved as contemplated, there is no doubt that there would be a considerable increase in the present water-borne commerce on the lower part and there would be numerous industrial plants built on the upper part guaranteeing a large future commerce from this portion. The amount of land available for industrial purposes is steadily decreasing and the prices are getting so high that what is left can not economically be utilized. The amount of dock frontage in the Chicago River and its branches available for new establishments is limited and the opening up of this section with some 8 miles of dock frontage and convenient access to the railroads would result in the establishment of numerous manufacturing plants. The land on both sides of the fork is high and dry and of sufficient extent for an unlimited number of plants.

16. The Chicago Sanitary District, a public corporation, directed by trustees elected by the people, have completed a waterway with clear widths of 120 feet through all its bridges and 200 feet width elsewhere from Lake Michigan for about 8 miles up the Chicago River and its branches to the mouth of the West Fork, and from thence an almost equally good waterway some 20 miles farther along its canal whose banks on both sides are available for the construction of wharves, docks, warehouses, and factories.

17. There are the same arguments for the availability of the land fronting on the drainage canal for the establishment of industrial plants as for that fronting on the west fork, with the further advantage that a deep through channel already exists for vessels of the largest dimensions.

18. The rental or sale of this property controlled by the sanitary commission will bring in some return to the general public for the great sums expended for their benefit, while the improvement of the West Fork will principally benefit the present private owners and put off all the further the time when the public will get this return from the construction of the drainage canal on account of the competition between the two localities.

19. The improvement of navigable waters by the United States is not usually undertaken except where such waters form through lines of public travel between States or large communities, or where they connect other large waterways with large centers of commerce beyond the control of a limited number of private corporations or individuals.

20. At present the drainage canal forms such a connection between the proposed territory considered and Lake Michigan, and thence with numerous commercial centers.

21. It would seem of doubtful propriety for the United States to expend large sums of money to duplicate this waterway, especially as the general public would receive only incidental benefit from it, and the parties benefitting by it would be the present holders.

22. It is easy to understand the strong pleas made by the owners of property and by the commercial organizations for the improvement of this stream whereby much of this land bought or held for legitimate speculative purposes will be increased in value many times. I am of the opinion that their views as to the desirability of this improvement are right, but I differ from them in holding that the improvement should be made by the municipality or by corporations, and not by the United States. This improvement might be made more economically by utilizing the collateral branch of the drainage canal and by the construction of other channels connecting with the drainage canal.

23. I am of the opinion that the harbor of Chicago should properly be located on the lake front instead of more than 8 miles inland beyond some 25 bridges. Such a harbor would provide for all the through traffic of Chicago which simply passes through the city in transshipment, and would relieve a large part of the congestion now existing in the rivers, leaving them available for local needs. This would render unnecessary the continued extension of the inner harbor by deepening the river and its branches farther and farther away from the lake. Such improvement has now reached the limit where it is more of a private benefit than a public utility and where the improvement by the United States is of doubtful propriety.

24. The estimate submitted in House Document No. 700, Fifty-ninth Congress, first session, for a 200-foot channel from Robey Street to Kedzie Avenue was $896,000. For the channel of the dimensions proposed the cost would be about $550,000. In addition to this the excavation above Kedzie Avenue would cost considerable, for although no rock excavation would probably be necessary, the unit price for dredging would be high on account of the difficulty of disposing of the dredged material, which must be towed 8 miles into the lake.

25. Therefore, on account of the relatively large cost whereby the general public would be but incidentally benefited; on account of the existence of the drainage canal which now forms a through waterway

of ample size to the lake; on account of the existence of ample unoccupied frontage on the drainage canal available for sites for industrial establishments; on account of the large expense the municipality and thereby the general public would be put to in the acquisition of the right of way, and the reconstruction of the present and future city and railway bridges, and the inconvenience resulting from their operation; and on account of the fact that the benefits for the present would be largely for private interests, I am of the opinion that the improvement is not worthy of being undertaken by the General Government.

26. If, however, in the future some form of cooperation might be arranged between the owners of the abutting property, the municipality, and other interests, and the United States whereby the United States, in addition to being relieved from all expenses in connection with the acquisition of the right of way and the reconstruction of the bridges, should furnish funds only in proportion to the benefits to be expected to accrue to the general commerce, I am then of the opinion that this improvement is worthy of further consideration.

Very respectfully,

CHAS. S. BROMWELL,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., November 8, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views expressed by the district officer in paragraphs 22 and 25, and in his opinion that the improvement is not worthy of being undertaken by the General Government.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[For Report of the Board of Engineers for Rivers and Harbors see p. 3.]

ILLINOIS RIVER, ILL., BETWEEN HURRICANE ISLAND AND CALHOUN COUNTY.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF ILLINOIS RIVER, ILL., BETWEEN HURRICANE ISLAND AND CALHOUN COUNTY, FOR THE PURPOSE OF PROVIDING A SUITABLE CHANNEL.

JANUARY 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 4, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copy of a report from Lieut. Col. George A. Zinn, Corps of Engineers, dated June 19, 1912, on preliminary examination of Illinois River, Ill., between Hurricane Island and Calhoun County, made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 3, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Illinois River, Ill., between Hurricane Island and Calhoun County.

1. There is submitted herewith for transmission to Congress report dated June 19, 1912, by Lieut. Col. George A. Zinn, Corps of Engineers, on preliminary examination of Illinois River, Ill., between Hurricane

Island and Calhoun County for the purpose of providing a suitable channel called for by the river and harbor act approved June 25, 1910.

2. The channel on the east side of Hurricane Island has been dredged under the existing project to a width of 200 feet and a depth of 7 feet in 1899 and 1901, and it is reported that this channel is in excellent condition and fully meets all demands of existing navigation. The improvement desired is a channel of similar dimensions on the west side of Hurricane Island for the greater convenience of a small community of farmers. For the reasons given, the district officer believes such an improvement to be unworthy of being undertaken by the United States and the division engineer concurs in this view.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report dated August 5, 1912, herewith. Interested parties were advised of the unfavorable tenor of the district officer's report and afforded an opportunity of appealing therefrom, but no communications of this nature have been received. The board concurs with the district officer and the division engineer that it is not advisable for the United States to undertake this improvement in the interests of general commerce and navigation.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Illinois River, Ill., between Hurricane Island and Calhoun County, for the purpose of providing a suitable channel in the manner apparently desired by the interests concerned as described in the reports herewith is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, August 5, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This is a report of preliminary examination of Illinois River between Hurricane Island and Calhoun County, for the purpose of providing a suitable channel, called for by the act of June 25, 1910. The channel on the east side of Hurricane Island has been dredged under the existing project to a width of 200 feet and a depth of 7 feet, and it is reported that this channel is in excellent condition and fully meets all demands of existing navigation. The improvement desired is a channel of similar dimensions on the west side of Hurricane Island for the greater convenience of a small community of farmers. The district officer states that such a channel would be expensive in the first place, would be longer by half a mile than the existing one, and would be difficult, if not impossible, of maintenance, unless the flow through the existing channel was reduced

or stopped entirely. At present the farmers use a landing above or below Hurricane Island, necessitating a greater wagon haul than would be required if a channel were provided on the west side of the island. The district officer states that no information is at hand that would give the approximate value of the saving to the community likely to result from the proposed improvement, but that the closure of the east channel would probably deny corresponding advantages to the land on that side of the island, and further, that the principal steamboat company doing business on the Illinois River has expressed the opinion that the present channel is adequate and that no additional business would result from making the desired change. He believes the improvement is unworthy of being made by the United States, and in this view the division engineer concurs. Interested parties were advised of the tenor of the district officer's report and given an opportunity of submitting statements and arguments to the board, but no communications of this nature have been received.

3. The improvement desired is the construction of an additional or auxiliary channel, not required in the interests of general or through commerce, but solely for the benefit of the farmers residing in the immediate vicinity. While the amount of commerce to be affected by the proposed improvement is not given, it consists almost entirely of farm products from a small tributary area, and therefore a large tonnage can not be expected. Under the existing project very satisfactory through channel conditions have been obtained in this vicinity, and these would be injuriously affected by the opening of an additional channel on the west side of the island, and no corresponding benefits would result. In view of the foregoing, the board concurs in the views of the district officer and the division engineer and expresses the opinion that it is not advisable to undertake the improvement of the Illinois River between Hurricane Island and Calhoun County in the interests of general commerce and navigation.

4. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF ILLINOIS RIVER, ILL., BETWEEN HURRICANE ISLAND AND CALHOUN COUNTY.

War Department,
United States Engineer Office,
Chicago, Ill., June 19, 1912.

Sir: 1. The act of Congress approved June 25, 1910, provides in section 3 for the following preliminary examination: Illinois River, Ill., between Hurricane Island and Calhoun County, for the purpose of providing a suitable channel.

2. The duty of making this examination having been assigned to this office, I have the honor to report as follows:

3. The locality is shown on sheets 1 and 2 of the map (not printed) of the Illinois and Des Plaines Rivers, 1.12 miles to the inch, made 1902–1905, under the direction of a board of engineers consisting of Col. O. H. Ernst, Lieut. Col. C. J. Allen, Maj. T. L. Casey, Maj. J. L. Lusk, and Lieut. Col. W. H. Bixby, all of the Corps of Engineers, United States Army. Hurricane Island itself extends from mile 25¾ to mile 28¼ above the mouth of the river at Grafton.

4. The channel on the east side of Hurricane Island was dredged to a width of 200 feet and depth of at least 7 feet 1899 to 1901, and recent examination shows that this dredged channel has not deteriorated. The channel on the west side of the island has less width and depth, being only 2½ feet deep at the head, but a practicable 3½-foot channel of reasonable width is now available from the foot of the island to within one-fourth mile of its head and a 5-foot channel to a point opposite the middle of the island.

5. Correspondence with the person chiefly interested in promoting a change, Mr. John M. Roth, of Michael, Calhoun County, Ill., shows that it is now desired to have a channel dredged on the west side of the island of the same dimensions as that on the east side. Copies of two letters received from Mr. Roth, appended hereto, disclose the desires and claims of those who favor the proposed improvement.

6. So far as can be ascertained the present channel is in excellent condition, and fully meets all demands of existing navigation. To create a channel of equal capacity on the west side of the island would be expensive in the first place, and, when made, would be longer by half a mile than the existing one. It would, moreover, be difficult, if not impossible, of maintenance unless the flow of water through the existing channel was reduced by some means or stopped entirely.

7. The demand for a channel on the west side of the island is based upon the needs of a community of about 40 families, owning about 1,500 acres of productive land on the west side of the river opposite Hurricane Island. At present, freight shipments by water are made at Crater's warehouse, located on the river about 1 mile above the head of the island. This warehouse landing can not be used at a river stage of 12 feet, at which stage the nearest landings to Michael post office (the post office for the above-mentioned community) are Kampsville, 4 miles above, or Godars, 3 miles below. Whether the west channel be improved or not, during high-river stages shipments by water must be made at Kampsville or Godars. The products of this vicinity—fruit and grain—form approximately 80 per cent of all shipments, and are moved during the low-water season from July to November. The effect of the improvement would probably, therefore, be to change the point of shipment from Crater's warehouse to a point on the west channel near the mouth of Michaels Creek, with a consequent saving in length of haul by team of about 1½ miles. No information is at hand that would give the approximate value of this prospective saving to the community, but on the other hand the closure of the east channel would probably deny corresponding advantages to the land on the east side of the river now being leveed and about to be put under cultivation.

8. It is understood that the improvement of the Illinois River is for the purpose of creating the cheapest and most advantageous

through channel, and that, except incidentally, landings and approaches to them are not to be improved by the United States, but that these necessary facilities must, if insufficient, be supplemented by local interests.

9. The demand for a channel on the west side of Hurricane Island is in reality for a landing and its approach channel, and it is asked that to satisfy a purely local need the United States shall in effect discriminate against another locality and in addition make a large expenditure.

10. The principal steamboat company doing business on the Illinois River has expressed the opinion that the present channel is adequate and that no additional business would result from making the desired change.

11. In view of the facts set forth, I have to report that the proposed improvement is unworthy of being made by the United States.

12. No questions of water power or forestation are involved in the examination, and terminal facilities have already been discussed in the preceding paragraphs.

13. In accordance with existing instructions, the local interests have been notified of the character of this report and of the further action open to them. Copy of the letter (not printed) of notification is herewith.

Very respectfully,

GEO. A. ZINN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., June 24, 1912.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer as stated in paragraph 11 within.

CHAS. L. POTTER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

LETTER OF MR. JOHN M. ROTH.

MICHAEL, ILL., *September 21, 1910.*

SIR: Your letter of the 16th instant is received.

In answer to your question will say: First question, "Will any new business be developed?" Yes; a town has been laid out, plat made, and already four lots sold at Michael, one-half mile from where the improvement is wanted. Second, "What will be saved in the hauling to landings?" Sixty per cent, as if we are hauling to Kampsville Landing, in travel from 5 to 7 miles; to Degerlias Landing, about 5 miles. These are the only regular boat landings we have at present. Third, "Where will landings be located?" About due east from Michael, one-half mile from river. Fourth, "If the channel was made, would landings be established and raised above high water, etc.?" Yes; Mr. Michael Zipprich, one of the landowners on the west side of Hurricane Island, in Calhoun County, has promised, so I am told, to establish a landing raised above usual high water and build a warehouse, which I verily believe he will do. He is financially able and have found him true to his promises. Besides, the farmers residing within 3½ miles would assist in work and money if we can only get the channel deepened, and the proposed new landing is as high as the other only landing yet in general use (Degerlias) between Kampsville and Hardin Landing, a distance of 12 miles. Fifth, "How many people will be benefited?" Forty-three families residing within about 3½ miles of the proposed new landing, who are mostly following the occupation farming, 90 per cent are landowners; besides, there are quite a number of families now living at that place shelling and fishing. I will gladly give any information called for I possibly can. We are justly entitled to the much-needed river improvement.

Yours, respectfully,

JOHN M. ROTH.

Mr. J. R. FULLER,
Junior Engineer, Peoria, Ill.

LETTER OF MR. JOHN M. ROTH.

MICHAEL, ILL., *September 28, 1910.*

DEAR SIR: Yours of the 23d instant received. Our idea on the size of the proposed channel between Hurricane Island and Calhoun County is it should be of the usual width and depth. It is our aim to make the west side of Hurricane Island the main channel, and if you see fit abandon the channel on the east side; I don't know of any steamboat landing on the Green County side east of island, as the land for miles (say, 3 or more) is swamp land, and none but a few fishermen living there.

Yours, very respectfully,

JOHN M. ROTH.

Mr. J. R. FULLER,
Junior Engineer, Peoria, Ill.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1225.

WETHERSFIELD COVE, CONNECTICUT RIVER, CONN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF WETHERSFIELD COVE, CONNECTICUT RIVER, CONN., WITH A VIEW TO SECURING A NAVIGABLE CHANNEL FROM SAID RIVER INTO SAID COVE.

January 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, January 4, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copy of a report from Maj. G. B. Pillsbury, Corps of Engineers, dated November 1, 1912, on preliminary examination of Wethersfield Cove, Connecticut River, Conn., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 3, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Wethersfield Cove, Connecticut River, Conn.

1. There is submitted herewith, for transmission to Congress, report, dated November 1, 1912, by Maj. G. B. Pillsbury, Corps of Engineers, on preliminary examination of Wethersfield Cove, Connecticut River, Conn., with a view to securing a navigable channel from

said river into said cove, called for by the river and harbor act approved July 25, 1912.

2. Wethersfield Cove is a small body of water near and below Hartford, Conn., situated about 700 feet in a direct line from Connecticut River and connected with it by a narrow channel 4 to 7½ feet deep, the navigable depth of which is limited to about 3 feet at ordinary low water by an iron sewer pipe which crosses the channel. There is no commerce utilizing the cove, and its use is at present confined chiefly to small pleasure boats. Additional depth is desired to provide increased facilities for these boats, and it is also claimed that the improvement would enable the State prison located near by to secure its coal at greatly reduced cost. The prison authorities do not appear to be particularly interested in the improvement of the cove, and in view of its small commercial importance the district officer reports unfavorably on its improvement at national expense. The division engineer concurs in the opinion expressed by the district officer.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 9, 1912, concurring with the views of the district officer.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Wethersfield Cove, Connecticut River, Conn., with a view to securing a navigable channel from said river into said cove, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 9, 1912.

To the Chief of Engineers, United States Army:

1. Wethersfield Cove is a pond or basinlike body of water about 3½ miles below Hartford, Conn., located about 700 feet within the shore line of the Connecticut River, with which it is connected by a narrow channel 4 to 7½ feet deep. At present the navigable depth is limited to about 3 feet at ordinary low water by an iron sewer pipe which crosses the channel. No previous examinations have been made by the United States, and no work of improvement has been undertaken.

2. The use of this body of water is confined principally to small motor craft, drawing from 18 inches to 4 feet, the greater number being pleasure boats. The district officer states that the improvement of the connecting waterway is urged, first, for the convenience of the motor boats as a harbor; second, it would lead to more general

use of the cove and relieve the harbor of Hartford from congestion; and third, a channel of sufficient size would lead to its use commercially. It is thought that the congestion is not serious and that it would not be greatly relieved by the proposed improvement, as the small boats now anchor in shallow water along the convex bank.

3. It appears that the strongest argument for the improvement from a commercial viewpoint is that it might be used in connection with the delivery of coal to the State prison, but the quantity required is not great, and the authorities of this institution do not appear to be particularly interested in the subject. In view of the small commercial benefit that would result from the improvement, the district officer is of opinion, in which the division engineer concurs, that the improvement is not justified at this time.

4. Those in interest were advised of the district officer's unfavorable report and given an opportunity of submitting their views. A statement has been received from the chairman of the Rivers, Harbors, and Bridges Commission of the State of Connecticut and given consideration.

5. From the facts presented, it appears that the improvement desired would be of some benefit and convenience to the owners of a number of pleasure craft, but that its value to general commerce and navigation would be practically negligible. The board concurs with the district officer and the division engineer and reports that it is not advisable for the General Government to undertake the improvement of Wethersfield Cove, Connecticut River, with a view to securing a navigable channel from said river into said cove.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF WETHERSFIELD COVE, CONNECTICUT RIVER, CONN.

UNITED STATES ENGINEER OFFICE,
New London, Conn., November 1, 1912.

From: District engineer officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Wethersfield Cove, Connecticut River, Conn.

1. The following report of the preliminary examination of Wethersfield Cove, Connecticut River, Conn., with a view to securing a navigable channel from said river into said cove, is submitted in compliance with the requirements of the act of Congress approved July 25, 1912.

2. Wethersfield Cove lies on the west side of the Connecticut River, about 3½ miles below the highway bridge at Hartford. It consists of

a pondlike body of water, roughly oval in shape, with an extreme length north and south of about 1,800 feet. At all ordinary stages of the river it is connected with the river only by a narrow and crooked channel about one-half mile long. At the narrowest point the easterly side of the cove is about 700 feet distant, in a direct line, from the west side of the river. To the northward of the cove and between it and Hartford is a broad alluvial flat, whose elevation is but slightly above the ordinary level of the river. To the south the cove is bordered by higher land.

3. The depths in the cove vary very greatly, from about 1 foot to over 20 feet. The low-water depths in the channel leading from the river into the cove vary from about 4 to 7½ feet, but the channel in which these depths exist is very narrow, in places less than 20 feet wide. At a point about 250 feet from the river the channel leading into the cove is crossed by a cast-iron sewer pipe, forming part of the sewage system of the city of Hartford, and this pipe reduces the available depth in the channel to about 3 feet at ordinary low water. The mean rise and fall of tide in the channel during the low stages of the river is about 15 inches, but it rapidly diminishes as the river rises. The drop of the low-water surface in the channel varies with the tide but is very small in extent. The banks and bottom are of alluvial material of moderate softness. Freshets of about 16 feet occur nearly every year, and extreme freshets of 22 feet or more occur occasionally.

4. No work of improvement has been carried on by the United States in Wethersfield Cove and no previous examinations of this locality have been made.

5. On account of the shoalness and narrowness of the entrance channel, none but small craft can enter the cove during the low-water stages of the river. It is used chiefly by small power boats, most of which are employed for pleasure purposes. This office is informed that there are 185 power boats, ranging in draft from about 18 inches to about 4 feet, which are owned in this vicinity and which customarily use the cove as a harbor. It is further stated that about 600 additional power boats and small pleasure craft occasionally enter the cove during the course of each season. The Wethersfield Cove Yacht Club has its headquarters in the cove, and there are also at least three other boat landings, including two at which the proprietors make a business of letting boats for hire. Except for these small boat landings, there are no commercial docks in the cove. The Connecticut State prison is situated at the southerly end and about 200 feet from the shore.

6. The improvement of the connecting waterway is urged by those interested (1) for the convenience of the motor boats using the cove as a harbor, (2) on the ground that the improvement would lead to a greater use of the cove and would relieve the harbor of Hartford from the congestion caused by the presence of large numbers of these small craft; (3) that a channel of sufficient size would be commercially valuable in that it would enable the State prison to secure its coal at a greatly reduced price.

7. It is unquestionable that deepening, widening, and straightening the channel would be beneficial for the pleasure and other small vessels which use the cove. It is not thought, however, that the congestion in the harbor of Hartford would be relieved to any extent.

This congestion, moreover, is not thought to be serious at the present time, as the small craft are anchored or moored in the shoal water along the convex bank. At the State prison about 2,000 long tons of coal are used per year. Most of it is usually delivered from Hartford in large automobile trucks, but a portion is landed at a dock on the river about a half mile distant from the prison, which is connected with the prison by a good macadamized road. It is stated by the warden that during the past year out of 2,000 tons used only about 200 tons were landed at this dock, the rest being hauled from Hartford. It does not appear, therefore, that the haul is a large factor in the cost of delivery. The prison authorities do not appear to be particularly interested in the improvement of the cove.

8. In view of the fact that little commercial navigation would be benefited by the improvement of the channel, I am of the opinion that the improvement of Wethersfield Cove, Connecticut River, Conn., with a view to securing a navigable channel from said river into said cove does not possess, at the present time, sufficient commercial importance to justify its improvement at national expense.

9. There are no private or public terminal or transfer facilities contiguous to the navigable waterway whose improvement is under consideration, except for small-boat landings. There appears to be no necessity for the construction of such terminals. There is no question of the development or utilization of water power for industrial and commercial purposes.

10. The waterway under consideration is not used to any appreciable extent in bringing fertilizer and supplies to farms and towns nor in sending farm products and manufactures to market.

G. B. PILLSBURY,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, November 8, 1912.

To the Chief of Engineers, United States Army, concurring in Maj. Pillsbury's recommendations.

W. M. BLACK,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see page 2.]

O

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1244.

LYNNHAVEN RIVER, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF LYNNHAVEN RIVER, VA., WITH A VIEW TO SECURING INCREASED DEPTH.

January 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 6, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Maj. E. E. Winslow, Corps of Engineers, dated October 18, 1912, with map, on preliminary examination of Lynnhaven River, Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 4, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Lynnhaven River, Va.

1. There is submitted herewith for transmission to Congress report dated October 18, 1912, with map, by Maj. E. Eveleth Winslow, Corps of Engineers, on preliminary examination of Lynnhaven River, Va., with a view to securing increased depth, called for by the river and harbor act approved July 25, 1912.

2. Lynnhaven River is a tidal estuary emptying into Chesapeake Bay about 5 miles west of Cape Henry and about 8 miles east of Norfolk, Va. Outside the mouth of the river is a shifting sand bar, over which there is a present depth of about 2½ feet at mean low water. The channel through the mouth for a short distance inside

the general line of the coast varies in depth from 7 to 13 feet, and its position, like that of the bar channel, is exceedingly changeable. The district officer states that the boats used in this vicinity have no difficulty in getting over the shoals at high water, but at and near low water their passage is interfered with, and it is desired that channels of moderate depth be dredged through the shoals. While the desired improvement would not require much work, conditions are unfavorable for its economical prosecution, and on account of the shifting nature of the shoals the cost of maintenance would probably be high. Consideration of the expense of the improvement in comparison with the small amount of business affected leads the district officer to believe that the river is not worthy of improvement by the United States. In this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 9, 1912, concurring with the views of the district officer and division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Lynnhaven River, Va., with a view to securing increased depth in the manner apparently desired by the interests concerned as described in the reports herewith is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 9, 1912.

To the Chief of Engineers, United States Army:

1. Lynnhaven River is a tidal estuary emptying into Chesapeake Bay about 5 miles west of Cape Henry, Va. The tidal range at the mouth is about 1½ feet. Two previous examinations of this river have been made by direction of Congress, the reports being unfavorable in both instances. There is an obstructive, shifting bar at the mouth of the river having a depth over it of about 2½ feet. On account of the great width of opening and the movable character of bottom, the district officer states it is evident that any permanent improvement would be exceedingly expensive.

2. Principal industry of the river is the growth of oysters in the upper river and fishing at and near the mouth. The shores are adapted for the growing of truck, which is at present a profitable industry. The fish and oysters are transported in boats to a landing provided by the Norfolk & Cape Henry Railroad at the end of its bridge over the river and carried by rail to Norfolk. The boats used for oystering are of comparatively light draft and at high water have no difficulty in going over the shoal places in the river, but at and near low water their passage is interfered with, and the improvement desired is the dredging of channels of moderate depth through the shoals.

3. The commerce of the river is estimated to consist of 1,200 tons oyster shells, 900 tons small oysters for planting, 1,250 tons of oysters, making a total of about 3,350 tons, valued at about $75,000. The examination indicates that, owing to the movable character of the bottom, the cost of maintainance of an improved channel would probably be high, and in view of this fact and the small amount of business affected, the district officer reports the locality as unworthy of improvement. In this view the division engineer concurs.

4. Those in interest were informed of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. In view of the characteristics of the stream as described within, the small amount of commerce at present, and the improbability of any material increase in the future, the board concurs in the views expressed by the district officer and the division engineer and reports that in its opinion the improvement of Lynnhaven River, Va., with a view to securing increased depth is not advisable by the General Government at the present time.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF LYNNHAVEN RIVER, VA.

War Department,
United States Engineer Office,
Norfolk, Va., October 18, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Preliminary examination of Lynnhaven River, Va.

1. The river and harbor act approved July 25, 1912, provides for a preliminary examination of Lynnhaven River, Va., with a view to securing increased depth.

2. Lynnhaven River is a tidal estuary emptying into the south end of Chesapeake Bay, about 5 miles west of Cape Henry, Va. The locality is shown on the Norfolk quadrangle of the Geological Survey maps on Coast Survey Chart No. 131, and on the accompanying tracing. The tracing last mentioned is based on old maps to which data has been added as to channel soundings and other facts obtained by a recent reconnoissance in connection with this preliminary examination.

3. At its mouth Lynnhaven River is about one-fourth of a mile wide, but a short distance inshore from its mouth the width increases considerably, part of this width being filled up with a large grassy marsh. Near this point the estuary divides into two parts, known as the Eastern and Western Branches, which with their tributaries, bays, and creeks extend up into the land to the southward.

4. The area drained by the Lynnhaven River is a flat, sandy plain, nowhere arising to more than 15 or 20 feet above tidewater. On account of the gentle slope and absorbent qualities of the land rainfall reaches the river somewhat slowly and brings practically no sediment with it, so shoaling takes place quite slowly.

5. On account of its great width and the comparatively small drainage area the river is not subject to freshets, and the fluctuations of water level are due entirely to tide. At its mouth the tidal variation is about 1½ feet. No question of water power or flood control are therefore involved in the subject of this preliminary examination.

6. This locality has twice previously been the subject of surveys and reports. The first was submitted in accordance with provision in the river and harbor act of March 3, 1879, which provided for the survey of the Lynnhaven River, Linkhorn Bay, and Broad Bay, tributary to the Lynnhaven from the east. The report on the second examination was submitted November 24, 1890, and was made in connection with the project for a waterway to connect Lynnhaven Bay and River with the Eastern Branch of the Elizabeth River, Va., the object being to give continuous inland-water transportation from Lynnhaven Bay to Norfolk, and thus avoid the passage through Hampton Roads.

7. The report of the latter survey was published in House Document No. 48, Fifty-first Congress, second session, and included a reprint of the older 1880 report. This document was embodied in report of the Chief of Engineers of 1891, page 1310. Both reports were unfavorable to the improvement of this river.

8. In front of the mouth of this river there is a shifting sand bar which changes in location from time to time. In 1880 it is recorded that the available channel depth on the bar was about 2 feet at ordinary low stage. The map of 1890 shows it to be about 2 feet. The present examination indicates a least channel depth of about 2½ feet at mean low water. On account of the great width of the opening and the easily movable sand composing the bar it is evident that any permanent improvement of this bar would be exceedingly expensive.

9. The channel through the mouth of the river, for a short distance inside of the general line of the coast, varies in depth from 7 to 13 feet, and its position, like that of the bar channel, is exceedingly changeable.

10. Across the river, near its mouth, there was built, in 1902, a drawbridge for the use of the Norfolk & Cape Henry Electric Railway, the draw opening being made 30 feet in the clear. At the time this bridge was built the best water was found close to the west end of the bridge, and the draw was accordingly located at that point; but a few years later this draw opening had shoaled up so as to be useless, and it was necessary to construct a new draw much nearer the middle of the bridge.

11. Above the junction of the eastern and western branches of this river the character of the bottom changes a great deal, and in place of the easily moving sand, found nearer the mouth of the river, the bottom in these branches consists, to a great extent, of mud very suitable for the cultivation of oysters, though here, too, sandy bottoms are found in a few places. The sand in these branches though is not as easily movable as nearer the mouth and the channel changes are slower.

12. From the reconnoissance made in this preliminary examination it was found that in the eastern branch there is now a least channel

depth of slightly over 2 feet at low water. In the western branch there is one shoal having a least channel depth of 2.8 feet and another shoal, farther up, where the least channel depth is about 3 feet. The channel through the latter shoal is very narrow, and either side of the best water the depth is very slightly over 2 feet.

13. A comparison of the depths shown by this reconnoissance with the maps of the more complete surveys made some years ago shows that, on the whole, the available channels are just about as deep now as they were some 10 or 20 years ago, but that the shoals are now located where formerly the water was a little deeper and, on the other hand, there is now better water than there was then in the shoals existing at that time. Taken as a whole, it may be said that this comparison shows that the navigable capacity of the river now is practically the same as it was in 1890; and if there has been any change, it has been for the better.

14. The principal industry of the river is the growth of oysters in the upper river and fishing at and near the mouth. The shores around the river are also well adapted for the growing of truck, which, at the present time, is a very profitable industry

15. All three of these kinds of produce, oysters, fish, and truck, require rapid transportation to market.

16. Prior to the construction of the Norfolk & Cape Henry Railroad the only practicable route to market was by water, crossing the bar at the mouth of Lynnhaven River, thence proceeding through the lower part of Chesapeake Bay, through Hampton Roads, and up the Elizabeth River to Norfolk. The construction of the railroad has, however, caused a great change in this, the produce of the truck farms being hauled directly to the railroad and being carried thence by rail to Norfolk. The fish and oysters are now transported in boats to a landing provided by the railroad company at the end of their bridge. Here the fish and oysters are packed in ice and are then carried by rail to Norfolk.

16½. The landing just referred to is the only landing or terminal on the river. It consists of a small wharf, less than 15 feet in any direction, connected by a narrow gangway with the railroad warehouse constructed close to and parallel to the tracks.

17. Though all the produce of this section is carried to Norfolk, it is not for consumption at that point, but for shipment thence to the northern cities by means of the fast boats which leave Norfolk from 6 to 8 o'clock every evening. For connection with these boats there is a freight train that passes Lynnhaven River about 1 or 2 o'clock in the afternoon, and it is essential that all fish and oysters be packed so as to be ready for shipment by this train.

18. The boats used for oystering and for transporting the oysters to the wharves at the mouth of the river are of comparatively light draft and at high water have no difficulty in getting over the shallow places in the channel, but at and near low water their passage is interfered with, and when low tide occurs at an unfavorable time in the day it is extremely difficult to obtain a load of oysters and transport them to the dock in time for shipment by the train. What the persons interested desire is, therefore, the dredging of channels of moderate depth through these shoals.

19. The only use at the present time made of the channel through the draw of the bridge and across the bar is for the passage of fishing

boats and the occasional bringing in of schooner loads of oyster shells and of small seed oysters for planting purposes. In such traffic there is usually no great urgency, and the schooners are able to wait for tide in crossing the bar.

20. From personal conversation with persons most interested in this oyster business and from letters which have been received it is estimated that the annual commerce of Lynnhaven River is about as follows: Oyster shells received for planting, 1,200 tons, valued at $2,400; small seed oysters for planting, 900 tons, valued at $12,000; shipped out, 1,250 tons of oysters, valued at $60,000; total commerce, about 3,350 tons, valued at about $75,000.

21. The improvement desired, the dredging of channels of moderate dimensions through the shoals, does not require very much work, but owing to the conditions the unit cost of doing the work would be very expensive. The depth across the outer bar is too small to allow entrance by a regular dredging plant, except by digging its way in, which would be expensive, and the width of draw is so narrow as to permit only a very small dredge.

22. There will also be great complication in disposing of the material. Hydraulic means of disposing of the sand will be difficult on account of the distance to the shores and the great probability of the material wherever deposited elsewhere in these rivers washing over and injuring or destroying oyster beds. If the material be merely dug out by a dipper and be placed on the banks of a cut the sand is of such a character that it will almost inevitably be carried back into the channel in a short time, which would make such an improvement be of a temporary character. The water is entirely too shallow for the use of scows and floats or boats could be used for this purpose only during extreme high water. For these reasons it is evident that the dredging of channels even of small dimensions would be exceedingly expensive.

23. Furthermore, the comparison of existing conditions with those shown on former surveys indicates that though there has been no very great difference in the navigability of the different branches of the river, yet, nevertheless, the shoals have changed their locations, which would indicate that the bottom is movable and, consequently, the cost of maintenance of an improved channel would probably be high.

24. Taking this high initial cost and the probable high cost of maintenance in consideration in comparison with the small amount of business affected, it would appear to me that this river is not worthy of improvement.

E. EVELETH WINSLOW,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., October 25, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

I agree with the district officer that this river is not worthy of improvement.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

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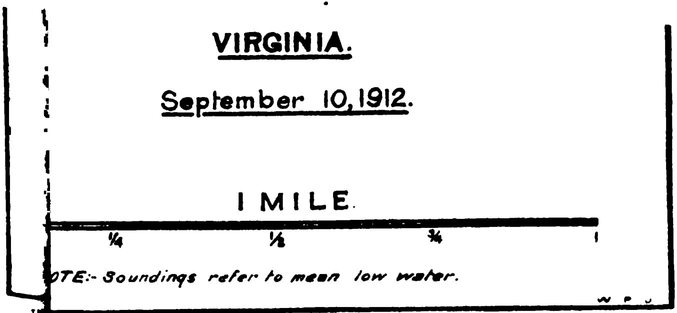


VIRGINIA.

September 10, 1912.

OTE:- Soundings refer to mean low water.

House Doc. No. 1244 ; 62d Cong., 3d Sess.

62d Congress, 3d Session. | HOUSE OF REPRESENTATIVES. | Document No. 1245.

EAST AND WEST WATERWAYS, SEATTLE HARBOR, WASH.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF EAST AND WEST WATERWAYS, SEATTLE HARBOR, WASH., WITH A VIEW TO MAINTENANCE BY UNITED STATES GOVERNMENT.

January 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, January 7, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Capt. Arthur Williams, Corps of Engineers, dated December 3, 1910, on preliminary examination of East and West Waterways in Seattle Harbor, Wash., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,
Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, January 6, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of East and West Waterways in Seattle Harbor, Wash.

1. There is submitted herewith, for transmission to Congress, report dated December 3, 1910, by Capt. Arthur Williams, Corps of Engineers, on preliminary examination of East and West Waterways in Seattle Harbor, Wash., with view to maintenance by United States Government, authorized by the river and harbor act approved June 25, 1910.

2. The State of Washington has entered upon the development of this portion of Seattle Harbor, under a project involving the improvement of the lower portion of Duwamish River, and its connection with Elliott Bay by way of two waterways constructed through the extensive tide flats, across which the river formerly flowed, and the reclamation of adjacent tidelands with the dredged material. These waterways are to be from 400 to 500 feet wide between pierhead lines, and 30 feet deep, and known as the East and West Waterways.

3. The district officer is of the opinion, in which the division engineer concurs, that this improvement will be worthy of maintenance by the United States when, upon suitable survey, the project is shown to be entirely completed; but that until so completed the United States should not take over any part of it for maintenance. It is understood by him that a large amount of dredging remains to be done.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated April 24, 1911. The board believes that it would be premature for the United States to take any part in this work at this time, and recommends that for the present no further steps be taken in the matter.

5. Final report by this office has been held back to await further reports as to the completion of the State work, but advices from the district engineer officer under date of November 30, 1912, are to the effect that physical conditions at this locality have not changed materially during 1911 and 1912, and as to some shoaling in the East Waterway, and that there seems no special advantage in further delaying the final report.

6. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement or maintenance by the United States of the East and West Waterways, Seattle Harbor, Wash., as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, April 24, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This is a report on preliminary examination of East and West Waterways in Seattle Harbor with a view to maintenance by the United States Government. These waterways form a connection through the tide flats between the mouth of the Duwamish River and Seattle Harbor. They are being improved by the State of Washington in connection with a general plan of development in this portion of the harbor, which contemplates a channel 400 feet wide and 30 feet deep at extreme low tide for a distance of 1,300 feet in Duwamish River, branching into two channels leading to Elliott Bay, having the

same depth, with widths varying from 400 to 500 feet, and lengths of 9,200 feet and 10,100 feet respectively. It is understood that a large amount of work yet remains to be done before the project will be completed. Along the completed portions of the channel a number of mills and factories are being located, and it is expected that a commerce of considerable magnitude will be developed.

3. The district officer expresses the opinion, in which the division engineer concurs, that it will be advisable for the United States to maintain these waterways after completion, but that no part of them should be taken over by the United States until the entire project is completed. He recommends that when the work is reported as completed that a survey be made, and if found to be as represented that the United States take charge of the waterways and maintain them, but if found incomplete that no further action in the matter be taken.

4. Believing that in the present incomplete state of the work it would be premature for the United States to take any part in the work being carried on in these waterways, interested parties were notified of the views of the board and given an opportunity of presenting statements or arguments bearing upon the questions involved, but no communications have been received.

5. In view of all the circumstances, the board believes that it would not be advisable for the United States at this time to enter upon or to commit itself to the maintenance of any part of the east and west waterways. If the project now under way is carried to completion and a general commerce created, it may then become advisable for the United States to take charge of the channels and maintain them, and this will be a proper subject for examination at that time, but for the present it is recommended that no further steps be taken in the matter.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other questions so related to the project proposed as to render the improvement advisable in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF EAST AND WEST WATERWAYS IN SEATTLE HARBOR, WASH.

United States Engineer Office,
Seattle, Wash., December 3, 1910.

Sir: 1. In compliance with department letter of August 4, 1910, I have the honor to submit the following report upon a preliminary examination of East and West Waterways in Seattle Harbor, with view to maintenance by United States Government, as directed in the river and harbor bill approved June 25, 1910.

2. The examination was made under my direction on November 1, 1910, by First Lieut. Joseph H. Earle, Corps of Engineers, and Asst. Engineer J. M. Clapp. A public hearing, which had been well advertised and at which interested parties were present or represented, was held in this office on November 5, 1910.

3. At the south border of Elliott Bay are extensive tide flats across which the Duwamish River flowed into Puget Sound before the

excavation of the waterways was commenced. On October 27, 1894, the State of Washington entered into a contract with the Seattle & Lake Washington Waterway Co. for the excavation of waterways through the tide flats at the mouth of the Duwamish and for the reclaiming of adjacent tidelands with the dredged material. The original time specified for the completion of this work has expired, but has been extended from time to time, and there now remains about a year for the contract as extended to run. Since the contract was made the State has sold the greater portion of the adjacent tidelands, title to the same now being held by private interests.

4. The State project contemplates dredging as follows: Beginning at a point of the Duwamish River about 10,500 feet south of the pierhead line in Elliott Bay, a single waterway 400 feet wide will extend north about 1,300 feet. Then the waterway will divide into two, each 400 feet wide, pierhead lines and bulkhead lines being coincident, one extending northeastward for about 3,400 feet and one northwestward for about 4,000 feet, to points from which the waterways extend due north and at which they are enlarged to 500 feet width between pierhead lines and 1,000 feet between bulkhead lines. These latter portions of the east and west waterways are about 6,500 and 5,200 feet long, respectively, and terminate at the pierhead line of Elliott Bay. The depth contemplated in the State's project is 30 feet at extreme low tide. It is understood that approximately one-half of the excavation has been done.

5. The Duwamish River, which flows into these waterways, and its tributaries are subject to floods in the spring and fall of each year, and occasionally these floods have been of violent character. In November, 1906, during a violent flood, the White River (at that time tributary to the Duwamish) changed its course and became a tributary of the Puyallup River, which flows into Puget Sound at Tacoma, Wash. The distance from the point of change to Puget Sound by way of Tacoma is about one-half of a similar distance by way of Seattle, and it is thought that the change is permanent. A portion of the waters of Cedar River now enters the Duwamish, but the Cedar will be entirely diverted into Lake Washington when the proposed Lake Washington Canal is completed. The Green River, a small stream flowing through a series of rocky canyons, will then be the only tributary of the Duwamish. When this is accomplished, it is thought that the amount of sediment brought down by the Duwamish will be small.

6. Since the work of dredging the east and west waterways has become well advanced, numerous manufacturing plants have been located upon the adjacent tidelands, and a number of piers have been constructed. The east side of the dredged portion of the east waterway is occupied throughout, and a number of important mills and factories are built or building and others are contemplated on Harbor Island, between the waterways, and on the west side of the west waterway.

7. The Northern Pacific and the Great Northern Railway Cos. are joint users of tracks which extend to points on both waterways. The Oregon & Washington Railway (of the Union Pacific system), the Chicago, Milwaukee & Puget Sound Railway, and the Columbia River & Puget Sound Railway parallel the east side of east waterway. It is understood that plans for a terminal arrangement are now being made whereby all railroads entering Seattle will reach

industries located on both waterways. The Civic Plans Commission of the city of Seattle is at work on harbor plans that contemplate certain changes in east waterway and provide for a system of municipal piers and slips in the Duwamish Valley to the south of the present waterways. Definite information concerning these proposed changes is not available at this time. The wharves constructed along the present waterways are adequate for present needs, and are being added to as commerce demands. The waterways are tidal throughout, and questions of water-power development do not enter.

8. These waterways, forming as they do a connection between the Duwamish River and Puget Sound, will be important navigable highways and as such should properly be under the control of and maintained by the War Department.

9. I am of opinion that east and west waterways in Seattle Harbor will be worthy of maintenance by the United States to the extent of preserving the dimensions to be obtained under the present contract between the State of Washington and the Seattle & Lake Washington Waterway Co., when the work under that contract is completed. It is understood that a large amount of dredging remains to be done, and it is not recommended that the United States take over any part of the waterways for maintenance until the entire project is completed. The assumption of any part of the cost of the improvement by the United States is to be especially guarded against, since the State has realized from the sale of reclaimed tidelands an amount probably much greater than that required for making the improvement.

10. It is therefore recommended that whenever the proper official of the State of Washington reports to this office that the waterways have been completed in accordance with the terms of the State project a survey at a cost of $200 be made to determine whether or not the waterways have been so completed, and if found that this is the case that the United States take charge of the waterways for maintenance as in the case of other navigable streams. If such survey shall show that the waterways are not complete, it is recommended that no further action in the matter be taken.

Very respectfully,

ARTHUR WILLIAMS,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., December 6, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion and recommendation of the district officer.

CHAS. E. L. B. DAVIS,
Brigadier General, United States Agent,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

O

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1246.

NANSEMOND RIVER, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF NANSEMOND RIVER, VA., WITH ESTIMATE OF THE COST OF REPAIRING AND REPLACING THE DIKES AT OR NEAR THE WESTERN BRANCH.

January 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 7, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copies of reports from Lieut. Col. E. E. Winslow, Corps of Engineers, dated October 17 and November 14, 1912, on preliminary examination and estimate of cost of improvement, respectively, of Nansemond River, Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 6, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination with plan and estimate of cost of improvement of Nansemond River, Va.

1. There is submitted herewith, for transmission to Congress, reports dated October 17 and November 14, 1912, by Lieut. Col. E.

Eveleth Winslow, Corps of Engineers, on preliminary examination and estimate, respectively, of Nansemond River, Va., for the purpose of ascertaining the cost of repairing and replacing the dikes at or near the western branch called for by the river and harbor act approved July 25, 1912.

2. Under the original and modified projects for the improvement of this stream a channel about 80 feet wide and 12 feet deep and a turning basin at Suffolk have been provided. The dikes referred to in the act were constructed in connection with this improvement and are essential to its successful maintenance. They are in need of certain repairs, which the district officer estimates will cost $4,500 and a probable future charge of $300 annually for maintenance. This work is properly a part of the maintenance of the existing project, and he believes that the expenditure of this sum for the purpose indicated is thoroughly justified by the commercial importance of the stream. The division engineer concurs in recommending appropriation of the funds desired.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 5, 1912, concurring with the views of the district officer.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Nansemond River, Va., by repairing and replacing the dikes at or near the western branch, is deemed advisable at an estimated cost of $4,500 for first construction and $300 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON PLAN AND ESTIMATE OF COST.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 5, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. This examination and survey have been made for the purpose of ascertaining the cost of repairing and replacing the dikes at or near the western branch. Under the original and modified projects for the improvement of this stream a channel about 80 feet wide and 12 feet deep has been provided. In the prosecution of the work certain dikes were constructed, and these are now in a state of partial disrepair. The dikes have fulfilled the purpose for which designed and are necessary for the successful maintenance of the project.

2. The commerce of the river has ranged from about 78,000 tons to 150,000 tons. The estimated cost of repairs to the dikes is $4,500, with a probable future charge of about $300 annually for maintenance.

The district officer and the division engineer believe that the dikes should be repaired and that the cost is justified by the amount of commerce involved.

3. The work contemplated herein is one of maintenance of the existing project and is obviously necessary and desirable at the expense of the General Government, and the board recommends that the amount of the estimate, $4,500, be provided in one appropriation.

4. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF NANSEMOND RIVER, VA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Norfolk, Va., October 17, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Preliminary examination of Nansemond River, Va.

1. The river and harbor act, approved July 25, 1912, provides for a preliminary examination of Nansemond River, Va., for the purpose of ascertaining the cost of repairing and replacing the dikes at or near the western branch.

2. The Nansemond River is a tributary of Hampton Roads, Va., which it enters from the south. The locality is shown on Coast Survey Chart No. 78a, and on the accompanying tracing.

3. This river has been under improvement for a number of years. In its original condition it could be navigated at mean low water by vessels drawing only 5 feet or less, the channel being obstructed by snags, logs, war obstructions, and shoals.

4. Between 1873 and 1878 Congress appropriated a total of $37,000, which was expended in removing snags, logs, war obstructions, dredging a channel to a depth of 8 feet, and the construction of dikes at the mouth of the western branch.

5. Opposite the mouth of the western branch the river is much wider than both above and below. Shoals existed at this point, and under the early appropriation there was constructed about 2,500 feet of dike, on the east side of the main river, opposite the western branch and about 1,100 feet of dike where the two branches come together. Some of these dikes were built of brush only and some of sheet piling. It is stated in the early reports that this dike construction had resulted in a scouring and increased depth in the channel affected by it.

6. Another survey of this river was made under the act of August 5, 1886, the report of which survey was published in annual report of the Chief of Engineers for 1887, page 1001. The river was reported as being again worthy of improvement by the repairing of old dikes and construction of retaining walls and dredging. The project

proposed was to provide a channel 12 feet deep from Suffolk to deep water below Town Point. There was to be a turning basin 200 feet square at Suffolk, a channel 100 feet wide from Suffolk to the mouth of the western branch—7 miles—while from this point to Town Point, a distance of 8 miles, the channel width was to be from 200 to 400 feet. The estimated cost of this work was $152,500.

7. Between 1888 and 1899, inclusive, Congress appropriated a total of $50,000, and with the funds thus provided work was carried on under the project just mentioned. The work consisted in the removal of snags, the repair and reconstruction in part of the dikes already constructed, and in dredging. The result of the work was to provide a turning basin at Suffolk and a channel of the project depth, namely, 12 feet, and nowhere less than 80 feet wide.

8. In 1890 the commerce of this stream amounted to over 200,000 tons, but by 1895 it had dwindled to about 60,000 tons and in 1900 to less than 17,000 tons. Consideration was again given to the project for the stream, and it was decided to be unnecessary to provide the widths of the channels covered by the former project, and that for the present at least a width of 80 feet would suffice.

9. Under this revised project work has been restricted to maintenance by occasional snagging and dredging of the restricted channel referred to. For such maintenance work $5,000 was appropriated in 1907, $5,000 in 1910, and $3,000 in 1911. Of this amount about $7,000 still remains unexpended, and it is intended to devote part of this unexpended balance to redredging parts of the channel during the present fiscal year. Since the last dredging was done on the river some slight shoaling has occurred, but it is believed that at the present time the river is navigable to Suffolk at mean low water by vessels of 11 feet draft. The normal tidal variations are about 3 feet at the mouth of the river and at Town Point, increasing to about 3.8 feet at Suffolk.

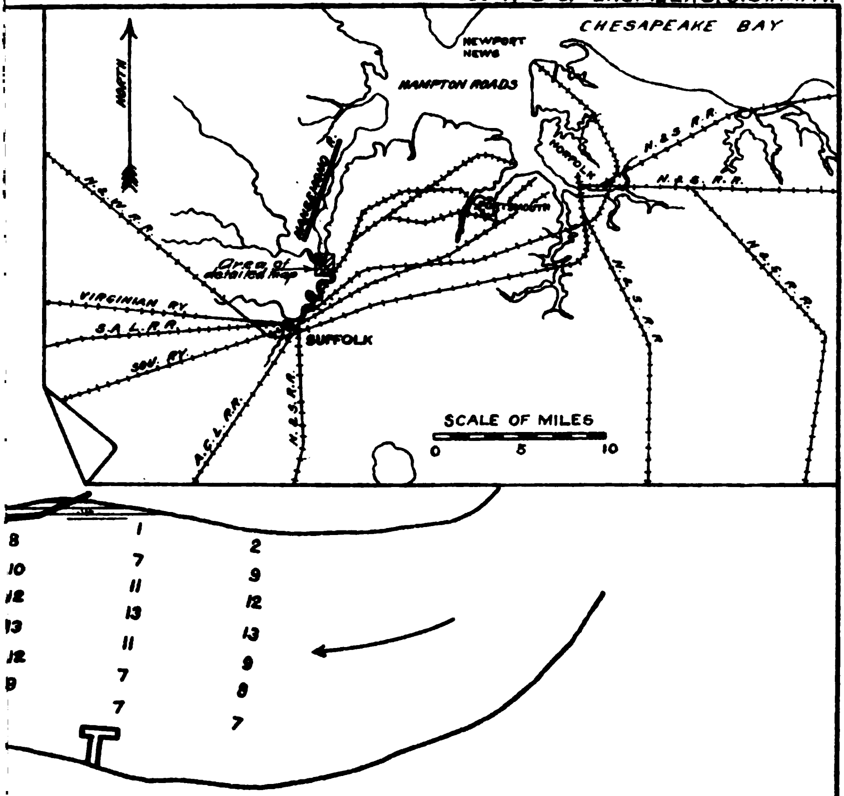
10. Since 1900 the annual commerce of the river has varied considerably, reaching a maximum of more than 150,000 tons in 1907, and being estimated for the calendar year 1911 at 78,041 tons.

11. By the terms of the act directing this preliminary examination consideration is restricted to the dikes near the mouth of the western branch. An examination of the condition of these dikes and sounding of the channels near them has been made, and it has been found that the dikes have well fulfilled their purpose.

12. Those which had been constructed on the west side of the main river where the western branch enters have caused a growth of the marsh and land so as to almost bury the dikes themselves. Behind the dikes on the eastern side of the channel large grassy marshes have been formed, which extend up to and include a considerable portion of these dikes themselves. The dike work is, however, badly decayed. There is one wide gap through the dike, and for several hundred feet at its lower end many of the sheet pile are missing. A considerable portion of the tidal flow escapes from the channel proper, and its scouring effect on the main channel is lost.

13. As these dikes have been so successful, first in a slight deepening of the channel, and then in the maintenance of the greater depths secured by dredging, it is believed that they should be restored, and that this should be done before any material shoaling occurs in the channels made by the dikes. This work, it is believed, will properly come under the head of maintenance of the present project for the

CORPS OF ENGINEERS, U.S. ARMY.



PART OF

NANSEMOND RIVER

VIRGINIA.

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W.P.J. 10/14/12

House Doc. No. 1248; 62d Cong., 3d Sess.

improvement of the stream. Estimate of the cost of doing this work can be submitted, if desired, without a regular survey being made.

12. No questions of water supply or flood control are involved in this improvement.

E. EVELETH WINSLOW,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., October 25, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

I agree with the district officer that the repair of these dikes is a proper and necessary work of maintenance and that the cost of doing it should be reported for the information of Congress, if funds in excess of those in hand are needed for its accomplishment.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 4, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. This river is being improved under a project which provides for a depth of 12 feet at mean low water. In the execution of the project certain dikes have been constructed, and the present inquiry is for the purpose of ascertaining the cost of repairing and replacing the dikes at or near the western branch. The district officer states that these dikes have well fulfilled their purpose in a slight deepening of the channel and in the maintenance of the greater depths secured by dredging, and he believes that they should be restored before any material shoaling occurs in the channel made by them. He believes, however, that this work will properly come under the head of maintenance of the present project for the improvement of the stream. The division engineer concurs with the district officer in the opinion that the repair of these dikes is a proper and necessary work of maintenance, and he states that the cost should be reported for the information of Congress, if funds in excess of those in hand are needed for its accomplishment.

2. From the information in hand it appears that the dikes are an essential feature in maintaining the present project and that they should be repaired and maintained. The carrying out of the work referred to in the act will not necessitate the adoption of a new project, as this work can be done under the existing one. However, as Congress has stated that this investigation is for the purpose of ascertaining the cost of repairing and replacing the dikes, an estimate of such cost would appear to be mandatory, although under ordinary circumstances this information would reach Congress in the annual report. In view of the facts, the board recommends that the district officer be authorized to submit an estimate.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PLAN AND ESTIMATE OF COST OF REPAIRING AND REPLACING DIKES ON THE NANSEMOND RIVER, VA., AT THE MOUTH OF THE WESTERN BRANCH.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Norfolk, Va., November 14, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Cost of repairing and replacing dikes on Nansemond River, Va.

1. The following estimate of cost of repairing and replacing the dikes on the Nansemond River, Va., at or near the mouth of the western branch of said river, is submitted in accordance with instructions contained in letter, Office of the Chief of Engineers, dated November 8, 1912.

2. As stated in my preliminary report, dated October 17, 1912, the dikes on the western side of the main river have been covered with a growth of marsh and land and require no work. The dike work on the eastern side of the river is, however, badly decayed in places, containing one wide gap, and it is in especially bad shape near the lower end of the work. The estimated cost of repairing this work is $4,500.

3. This dike work, when thoroughly repaired, should require no additional repairs for a number of years, but it is estimated that the annual cost of maintaining these dikes will probably average about $300, though the work will only have to be done at intervals of several years.

4. This estimate is in addition to the balance remaining from the appropriation for "Improving Nansemond River, Va.," which balance will be needed in the near future for redredging shoals. This balance at the present time is slightly over $7,000.

5. It is believed that the appropriation of the additional amount estimated above for the maintenance of the improvement, by repairing the dikes, $4,500, is thoroughly justified by the commercial importance of the stream. The entire amount should be made available at one time.

E. EVELETH WINSLOW,
Lieut. Col., Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
November 15, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

It appearing from the report of the district officer that additional money will have to be appropriated to complete the proposed repairs, it is recommended that Congress be asked for the desired amount.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

[For Report of the Board of Engineers for Rivers and Harbors on plan and estimate of cost of repairing and replacing dikes, see p. 2.]

O

62d Congress, } HOUSE OF REPRESENTATIVES. { Document
3d Session. } { No. 1247.

SAVAGES CREEK, VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF SAVAGES CREEK, VA., WITH A VIEW TO PROVIDING A SUITABLE CHANNEL FROM CHESAPEAKE BAY TO EASTVILLE.

January 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 6, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Lieut. Col. E. E. Winslow, Corps of Engineers, dated October 26, 1912, with map, on preliminary examination of Savages Creek, Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 4, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Savages Creek, Va.

1. There is submitted herewith, for transmission to Congress, report dated October 26, 1912, with map, by Lieut. Col. E. Eveleth Winslow, Corps of Engineers, on preliminary examination of Savages Creek, Va., with a view to providing a suitable channel from Chesapeake Bay to Eastville, called for by the river and harbor act approved July 25, 1912.

2. Savages Creek is a small, shallow stream having a length of about 2½ miles. It empties into a minor channel of Chesapeake Bay known as Hungers Channel, which lies approximately parallel with the shore, and is separated from deep water in Chesapeake Bay by a long shoal. The district officer states that the community is strictly an agricultural one, there being on the shores of the creek a few small farms which at present move their produce in row or flat boats out to Hungers Channel, whence it is taken by motor boats to Cape Charles City. The dredging of the creek to a depth of at least 4 feet is desired in order that supplies may be brought in to the merchants at Eastville via the water route instead of by rail, as at present. To obtain even the moderate depth of 4 feet would require dredging through almost the entire length of the creek, and the channel across the bar between the mouth of the creek and Hungers Channel would be difficult to maintain unless expensive jetties were built. The cost of the dredging alone is believed by the district officer to be out of proportion to the commerce involved, and he therefore expresses the opinion that this stream is not worthy of improvement by the United States. In this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated December 5, 1912, concurring with the views of the district officer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Savages Creek, Va., with a view to providing a suitable channel from Chesapeake Bay to Eastville, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 5, 1912.

To the Chief of Engineers, United States Army:

1. This is a small tidal creek not exceeding 2½ miles in length, having depths ranging from a minimum of less than a foot to a maximum of 4½ feet. Eastville, with a population of 322, is situated about three-fourths of a mile above the head of the creek, with which there is no road connection.

2. The community is an agricultural one, a few small farms being located on the shores of the creek, the produce being moved in row or flat boats to Hungers Channel near the mouth of the creek, whence it is taken by motor boats to Cape Charles City. The improvement desired is a channel at least 4 feet deep. This would necessitate dredging almost the entire length of the creek, and the indications are that it would be difficult to maintain an entrance channel.

3. It is estimated by those interested that if the improvement were made that the merchants of Eastville would get their supplies by the

creek and that under these circumstances the commerce might amount to 4,500 tons. The district officer states that a rough estimate shows that the cost of the dredging alone would be out of all proportion to the present and prospective commerce, and he concludes with the opinion, in which the division engineer concurs, that the improvement is inadvisable.

4. Interested parties were informed of the adverse report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. It seems from the facts presented that the cost of improving this creek would be excessive when compared with resulting benefits, and therefore the board concurs in the opinion that it is not advisable for the United States to undertake the improvement of Savages Creek, Va.

6. In compliance with law the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SAVAGES CREEK, VA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Norfolk, Va., October 26, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Preliminary examination of Savages Creek, Va.

1. The river and harbor act, approved July 25, 1912, provides for the preliminary examination of Savages Creek, Va., with a view to providing a suitable channel from Chesapeake Bay to Eastville. Eastville is a small town about a mile from the station of that name on the New York, Philadelphia & Norfolk Railroad. Its locality is on the eastern shore of Chesapeake Bay, about 18 miles above Cape Charles. It is shown on sheet 2, Coast Survey Chart No. 32, and on a tracing accompanying this report, the tracing having been made from Coast Survey data with the addition of soundings and other information obtained on a recent examination.

2. Eastville is situated not on the shore of Savages Creek, but about three-fourths of a mile from it, and at present there is no road directly connecting the town with the creek near its upper end, though, undoubtedly, a right of way could be obtained and a road could be built.

3. On the Coast Survey Chart, Savages Creek is not so called, but is merely marked "Gulf." Savages Creek is a very small one, from the head of the creek to its mouth being only about 2½ miles, and it is also exceedingly shallow, the maximum channel depth not exceeding 4½ feet below mean low water plane and the channel depth being in several places less than 1 foot below that plane. Furthermore, the creek does not empty into the deep water of Chesapeake Bay,

but into a narrow minor channel known as Hungers Channel, which runs approximately parallel to the shore line and is separated from the deep water of the bay by a long shoal. Immediately opposite the mouth of Savages Creek, Hungers Channel is about 10 or 12 feet deep, but about a mile below, at the crossing from this channel to the deep waters of the bay, the available depth is much less.

4. The creek is tidal, the average rise and fall of the tide being about 2½ feet. It is not subject to freshets, and no questions of flood control or water power are involved. The creek is practically free from snags and similar obstructions.

5. The community is strictly an agricultural one, there being located on the shores of the creek a few small farms, which at present move their truck in row or flat boats out to Hungers Channel, whence it is taken by motor boats to Cape Charles City. There are no regular wharves, but simply a few private landings for the use of row or flat boats.

6. It is desired by the persons living along its banks that this creek be dredged out so as to provide a channel at least 4 feet deep at low water, and it is estimated that if this is done, there would be large shipments of potatoes and corn and considerable fertilizer would be brought in, that a road would probably be built from Eastville, and the merchants of the town would receive their freight in this way. It is estimated by the persons interested that the annual freight under these conditions might amount to about 4,500 tons. All papers[1] received on this subject are forwarded herewith.

7. From the soundings taken during the examination, and as shown on the map, it is evident that to get even the moderate depth of 4 feet dredging would be required, not at a few places only, but through almost the entire length of the creek. Within the creek proper it is probable that the maintenance of a dredged channel would not be difficult, but judging from experience at Cape Charles City, some 5 or 6 miles farther south, it is evident that the channel across the bar between the mouth of the creek and Hungers Channel would be extremely difficult to maintain unless the project were enlarged so as to provide for expensive jetties on either side of the channel.

8. A rough estimate of the cost of doing the dredging alone shows that the cost of the work would be very great and out of all proportion to any present or prospective commerce. For these reasons Savages Creek is not considered worthy of improvement by the United States.

E. EVELETH WINSLOW,
Lieut. Col., Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., October 29, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

Owing to the cost and difficulty of even a very moderate improvement and the small advantage that would result from it, I agree with the district officer that this creek is not worthy of improvement at this time.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

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[1] Not printed.

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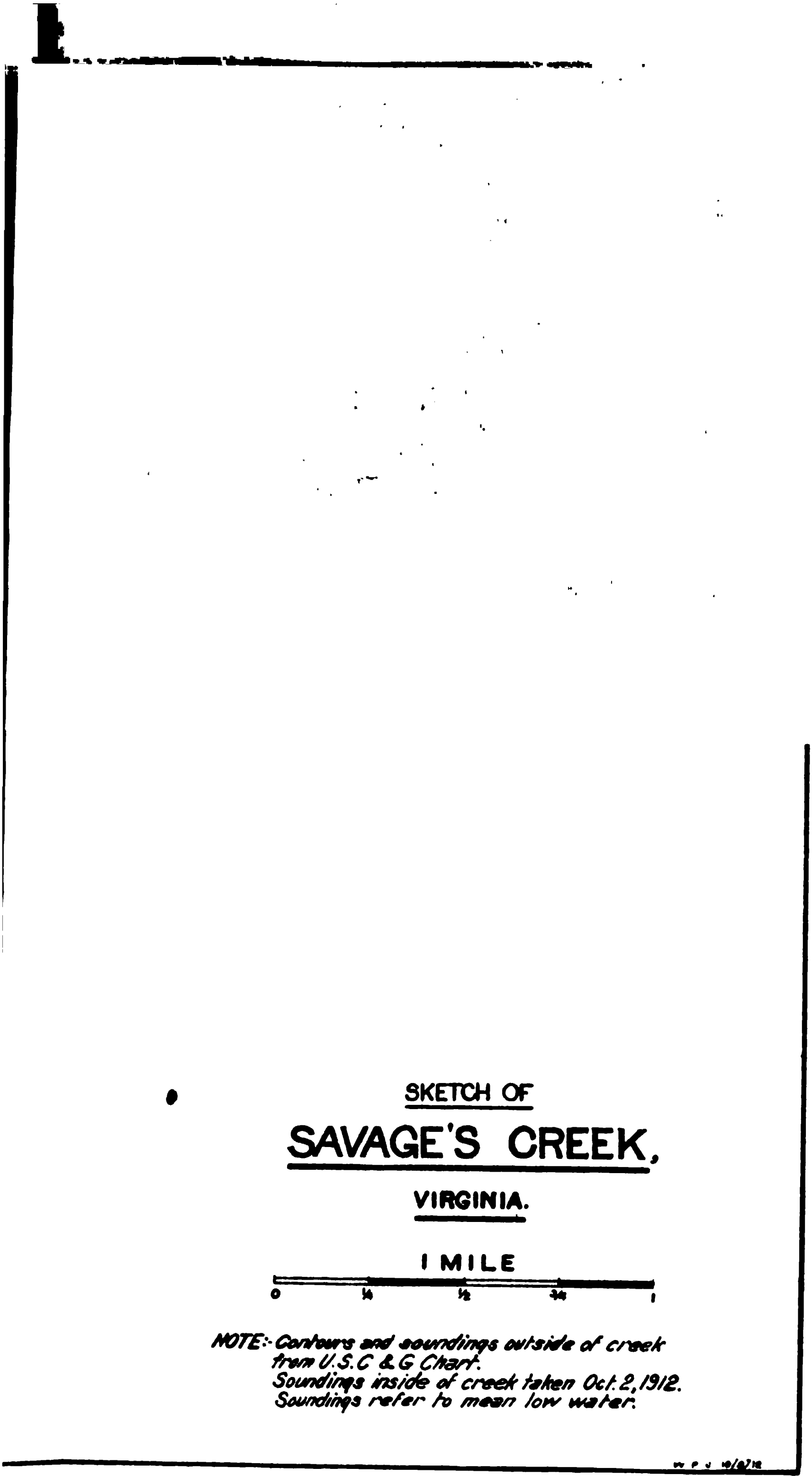

SKETCH OF

SAVAGE'S CREEK,

VIRGINIA.

NOTE:- Contours and soundings outside of creek from U.S.C & G Chart.
Soundings inside of creek taken Oct. 2, 1912.
Soundings refer to mean low water.

NEW HAVEN HARBOR, CONN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF NEW HAVEN HARBOR, CONN.

JANUARY 10, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 8, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 7th instant, together with copies of reports from Maj. G. B. Pillsbury, Corps of Engineers, dated October 14 and December 11, 1912, with map, on preliminary examination and survey, respectively, of New Haven Harbor, Conn., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 7, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of New Haven Harbor, Conn.

1. There are submitted herewith, for transmission to Congress, reports dated October 14, and December 11, 1912, with map, by Maj. G. B. Pillsbury, Corps of Engineers, on preliminary examination and

survey, respectively, of New Haven Harbor, Conn., called for by the river and harbor act approved July 25, 1912.

2. Under the approved project for improvement of New Haven Harbor, a channel has been provided 20 feet deep and 400 feet wide from Long Island Sound to the canal dock, thence of the same depth and 300 feet wide to Tomlinsons Bridge, and certain anchorage basins and auxiliary channels have been dredged. The district officer states that the depth has proven adequate for the character of commerce utilizing this port, but on account of the narrowness of the channel and the congestion of traffic in the upper part of the harbor great difficulty is experienced in maneuvering and berthing vessels at the adjacent wharves. To remedy this difficulty, he recommends that the 20-foot channel be widened from the 20-foot anchorage basin to Tomlinsons Bridge, as shown on the accompanying tracing, at an estimated cost of $202,000. The division engineer concurs in this recommendation.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith, dated December 23, 1912, concurring with the views of the district officer.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of New Haven Harbor, Conn., is deemed advisable so far as to secure an available depth of 20 feet in the area of the upper harbor indicated on the accompanying tracing, at an estimated cost of $202,000 for first construction and the amount necessary annually for maintenance, this estimate being based on the supposition that the work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $80,000 and subsequent appropriation of about $60,000 per annum.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors.
December 23, 1912.

To the Chief of Engineers, United States Army:

1. As a result of survey, the district officer presents an estimate for widening the upper portion of New Haven Harbor to a depth of 20 feet at mean low water in the sum of $202,000, which is almost identical with the estimate for this work favorably recommended in House Document No. 1159, Sixtieth Congress, second session, referred to in report on preliminary examination. The district officer reaffirms his favorable recommendation for this improvement, and the division engineer concurs with him.

2. As stated in third indorsement on the report of preliminary examination, the need for this improvement is manifest, and as the

estimate is considered reasonable, the board concurs with the district officer and the division engineer and renews its recommendation for the widening of New Haven Harbor to a depth of 20 feet at mean low water as proposed by the district officer and shown on accompanying tracing, at an estimated cost of $202,000. The district officer states that the cost of maintenance should not be materially in excess of that necessary for the present channel. The board agrees with the district officer that the initial appropriation should be $80,000 and subsequent appropriations $60,000 annually.

3. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
· *Senior Member of the Board.*

PRELIMINARY EXAMINATION OF NEW HAVEN HARBOR, CONN.

United States Engineer Office,
New London, Conn., October 14, 1912.

From: District engineer officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Report of preliminary examination of New Haven Harbor, Conn.

1. The following report of the preliminary examination of New Haven Harbor, Conn., is submitted in compliance with the river and harbor act of July 25, 1912.

2. New Haven Harbor is located on the northerly side of Long Island Sound, about 71 miles to the eastward of New York Harbor. It consists of a bay about 4 miles long and from 1 to 4 miles wide, and of the tidal portion of three streams entering into the bay. These streams are, the West River, on the westerly side, and the Mill and Quinnipiac Rivers, emptying into the northeasterly corner of the bay through a common mouth. In its natural condition the upper portion of the bay is shallow. In the lower or outer portion depths from 12 to 25 feet are found.

3. The harbor has been under improvement by the General Government since 1870. The improvements accomplished consist of a channel 20 feet deep, 400 feet wide, and 4 miles long, from Long Island Sound to the Canal Dock; thence of the same depth and 300 feet wide for one-half mile farther to Tomlinson Bridge; adjoining this channel 3 anchorage basins having 20, 16, and 15 foot depths, respectively; a channel 100 feet wide and 12 feet deep from the upper anchorage basin to Brewery Street; a channel 100 feet wide and 9 feet deep from the middle, or 16-foot, anchorage basin across the flats and up the West River as far as Kimberly Avenue Bridge; thence of same depth and controlling width of 75 feet, farther up the river to the New York, New Haven & Hartford Railroad Co. bridge; a channel up the Quin-

nipiac River, 200 feet wide and 12 feet deep, to the Ferry Street Bridge; a channel up Mill River, 200 feet wide and 12 feet deep, to the junction of the two branches above Chapel Street, and thence 12 feet deep and 75 feet wide up both branches to the Grand Avenue Bridge. In addition, 3 breakwaters have been constructed at the mouth of the harbor to protect the harbor itself and form a harbor of refuge; and some isolated rocks have been removed. The river and harbor act of July 25, 1912, provided appropriations for enlarging the channels in West River, and in Mill and Quinnipiac Rivers, in accordance with reports published in House Documents No. 535, Sixty-second Congress, second session, and No. 26, Sixty-second Congress, first session, respectively.

4. Navigation in the upper harbor is limited by the channels and basins above described. The maximum draft which could be carried June 30, 1911, through the main channel to Tomlinson Bridge was about 20 feet at mean low tide; above Tomlinson Bridge, 12 feet could be carried up Mill River to Grand Avenue Bridge, and up the Quinnipiac River to Ferry Street Bridge, with 6 feet from Ferry Street Bridge to Grand Avenue Bridge on this river; up the West River 7 feet could be carried. The mean rise and fall of tide in this harbor is about 6 feet.

5. The main channel of the harbor is not crossed by any bridge. The subsidiary channels are crossed by various drawbridges, but the improvement of these channels is already provided for.

6. New Haven Harbor has been the subject of frequent examinations and surveys, the last three of which are as follows: For the main harbor, House Document No. 1159, Sixtieth Congress, second session; for Mill and Quinnipiac Rivers, House Document No. 26, Sixty-second Congress, first session; for West River, House Document No. 535, Sixty-second Congress, second session.

7. New Haven is the largest city in the State of Connecticut and has a very considerable commerce. The water-borne commerce has not varied greatly from 2,000,000 tons per year for the last four years. While there is little change from year to year in the tonnage, the value of the merchandise has increased steadily from $98,233,543.22 in the calendar year 1908 to $124,261,691.17 in 1911. For the calendar year 1911, about 60 per cent of this commerce was coal, about 30 per cent general steamboat freight, and the remainder largely lumber and other building materials. About 70 per cent was handled in the main harbor.

8. While the channels in the main harbor are now of sufficient depth to accommodate the vessels engaged in the trade at this port, there is not sufficient room in the upper portion of the harbor, in the portion extending from Long Wharf to Tomlinsons Bridge, to properly accommodate the traffic. Practically all of the freight received in the main harbor is handled at the docks situated at the northerly side of the main channel and within less than 3,000 feet of the bridge. As the channel is but 300 feet wide, this portion of the harbor is frequently very much congested, and difficulty is experienced in maneuvering vessels and berthing them at the slips. It is believed that increased width would afford relief in the winter when this portion of the channel is frequently badly blocked by ice. After consultation with the parties interested in the use of the harbor, I find that the widening of this portion is the improvement desired.

This widening was recommended in a report published in House Document No. 1159, Sixtieth Congress, second session, but has as yet not been authorized by Congress.

9. In view of the large amount and general character of the commerce to be benefited, I am of the opinion that New Haven Harbor is worthy of further improvement by the General Government in the manner indicated and I recommend that a survey be made to determine the extent and estimate the cost of the improvement.

10. The terminal and transfer facilities of the port are briefly as follows: There is one public wharf, called the city wharf, bordering on the 15-foot anchorage basin, at which terminal facilities are extended to all on equal terms. Wharfage is charged. It is understood that the city proposes to utilize for dock purposes at least a portion of the adjacent property, situated between the Starin dock and the city wharf. Neither of these public wharves connect with rail and water lines. Access to the city wharf can be had only by teams and its distance to the nearest freight station is a little over one-half mile by street. The street leading to the dock is not paved. The New York, New Haven & Hartford Railroad Co. owns four docks, which, so far as their facilities admit, are open to all on equal terms. These are Belle, Middle, Pocket, and Canal Docks. All are equipped with modern facilities and have rail connections. Middle and Pocket Docks are used exclusively for transshipping coal from vessels to cars. Belle Dock is used mainly for towboat purposes. Canal Dock is used for coal and other freight and is used for transfers by team as well as by rail. There are two other privately owned docks without rail connections, which are open to the public at large on equal terms, wharfage being charged; several steamboat docks used exclusively by the lines by which they are leased, and numerous smaller private docks, not open to the public. While existing terminal facilities in New Haven Harbor are somewhat inadequate, particularly as regards publicly owned structures, there is ample room for future expansion. Such expansion is necessary if the city is to avail itself to the fullest advantage of the lower channels already provided, but increased deep-water area in the upper harbor must be secured before any added terminal facilities would enjoy their full benefits.

11. As New Haven Harbor is a tidal waterway there is no question of water power or other related subjects involved. There is transmitted herewith an outline map of the harbor and the improvements therein.

G. B. PILLSBURY,
Captain, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, October 17, 1912.

To Chief of Engineers, with recommendation that the survey be authorized.

W. M. BLACK,
Colonel, Corps of Engineers.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 4, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The improvement contemplated in the report of the district officer is the widening of the upper portion of the main channel where most of the commerce of the port is handled and where, owing to the narrowness of the channel, congestion is at times experienced. A careful investigation of the needs of commerce and navigation at this port was made under authority of the act of March 2, 1907. The need of additional width in this portion of the harbor was then apparent, and such widening was recommended by the board in a report which is published as House Document No. 1159, Sixtieth Congress, second session, but Congress has not yet authorized the work.

2. The improvement now desired is of a similar character to that recommended in said document, and it appears that the need of this work is still manifest. To determine any changes that may have taken place since the former investigation and the cost of the work now required, the board concurs with the district officer and the division engineer in recommending the authorization of such survey as may be necessary for this purpose.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

SURVEY OF NEW HAVEN HARBOR, CONN.

UNITED STATES ENGINEER OFFICE,
New London, Conn., December 11, 1912.

From: District engineer officer.
To: The Chief of Engineers, United States Army.
(Through the Division Engineer.)
Subject: Survey of New Haven Harbor, Conn.

1. The following report of the survey of New Haven Harbor, Conn., is submitted in compliance with instructions contained in your letter of November 7, 1912, and under authority of the act of Congress approved July 25, 1912.

2. A description of the harbor and of the existing conditions is given in the report of the preliminary examination, submitted October 14, 1912. That report pointed out the advisability of widening the channel in the upper portion of the harbor to relieve the congestion of traffic now existing in that section. The field work of the survey was limited to the portion of the harbor in which the improvements were contemplated. In addition to the usual soundings, the character of the bottom was examined by forcing down a steel rod.

3. Investigations made in connection with the survey confirmed the conclusions previously expressed. The volume of commerce received and shipped immediately adjacent to this comparatively restricted waterway amounted to 1,382,906 short tons during the calendar year 1911, and additional commerce amounting to 478,431 short tons

passed through the channel en route to Mill and Quinnipiac Rivers. On account of the narrowness of the channel and the congestion of traffic, great difficulty is experienced in maneuvering and berthing vessels at the adjacent wharves. In addition to relieving the congestion, it is hoped, as was remarked in the report of the preliminary examination, that the proposed improvement would mitigate the ice conditions, now a source of expense and delay in winter. A broader channel would allow the fields of ice which form on the adjacent flats and gradually push out into the channel, to pass out more readily with the tide, as broken by the traffic or by the boats that are employed for that purpose. A further ground advanced for the improvement by those interested in the navigation of the harbor is that it will afford a straighter channel to the docks. Vessels coming up the main channel, particularly at night, with the confusion of the lights of the city, not infrequently miss the present channel above the anchorage basin and ground on the point opposite Cranes Bar.

4. It is recommended, therefore, that the upper channel be widened to the line shown on the accompanying map, to a minimum depth of 20 feet at mean low water. This depth is so chosen to conform to the depth of the main entrance channel to the harbor, and is regarded as suitable for the navigation of vessels having a maximum draft of slightly less than 20 feet.

5. The estimated cost of the improvement is as follows:

Dredging 1,600,000 cubic yards, at 12 cents	$192,000
Superintendence, inspection, and contingencies	10,000
Total	202,000

It is thought that the cost of maintenance will not be materially in excess of that necessary for the present channel, as the deterioration of this channel is believed to be principally caused by the heavy bank adjacent to the channel; and the length of this bank will not be increased.

6. In order to provide for the economical and advantageous prosecution of the work, an initial appropriation of not less than $80,000, and subsequent appropriations of $60,000 per annum, are regarded as necessary.

G. B. Pillsbury,
Major, Corps of Engineers.

[First indorsement.]

Office of Division Engineer, Northeast Division,
New York, December 14, 1912.

To Chief of Engineers, concurring in the recommendations of the district engineer officer.

W. M. Black,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 2.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1259.

WHITE RIVER AT DEVALL BLUFF, ARK.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF WHITE RIVER AT AND NEAR DEVALL BLUFF, ARK., WITH A VIEW TO IMPROVEMENT FOR NAVIGATION AND THE REVETMENT OF THE BANKS IN COOPERATION WITH LOCAL INTERESTS.

January 10, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, January 8, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 7th instant, together with copies of reports from Maj. C. S. Smith and Maj. E. M. Markham, Corps of Engineers, dated September 8, 1911, and September 24, 1912, with maps, on preliminary examination and survey, respectively, of White River at and near Devall Bluff, Ark., made in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, January 7, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of White River at and near Devall Bluff, Ark.

1. There are submitted herewith, for transmission to Congress, reports dated September 8, 1911, by Maj. C. S. Smith, Corps of

Engineers, and September 24, 1912, with maps, by Maj. E. M. Markham, Corps of Engineers, on preliminary examination and survey, respectively, of White River at and near Devall Bluff, Ark., with a view to improvement for navigation and the revetment of the banks in cooperation with local interests, called for by river and harbor act approved June 25, 1910.

2. The object of the desired improvement is to prevent a cut-off opposite the town of Devall Bluff, and to arrest the caving of the banks along the front of the town. The district officer presents an estimate in the sum of $30,000 for the work required to fully protect the narrows against cut-off, involving the construction of revetment between points A and B, and E and F, as shown on one of the maps, and levee construction from C to D. He states that the accomplishment of the first item, the construction of the revetment A–B at an approximate first cost of $14,000 and $600 annually for maintenance, will effectually prevent the cut-off and provide for all work in which the Federal Government would have any responsibility or interest, and he therefore recommends only this portion of the proposed project. The Industrial League at Devall Bluff has agreed to contribute $6,000 and to furnish free stumpage of brush as the local cooperation in this improvement, leaving as the full share of the cost to be borne by the United States the sum of $8,000. This amount the district officer recommends be appropriated and this recommendation is concurred in by the division engineer.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors and attention is invited to its report, herewith, dated October 14, 1912. After careful review of this case the board concurs with the district officer and the division engineer in recommending the appropriation of $8,000 by the United States, to be used in cooperation with the local contribution in the construction of the revetment A–B.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of White River at Devall Bluff, Ark., by the construction of the revetment A–B, is deemed advisable, following in general the methods described in the report of the district officer, at an estimated cost of $14,000 for first construction and $600 annually for maintenance, provided local interests contribute $6,000 toward the improvement and furnish free stumpage of brush therefor. These estimates are based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $8,000, the entire estimated cost to the United States.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, October 14, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. A survey of the White River at Devall Bluff having been made by the district officer, he submits the following estimate of cost of the work required to fully protect the narrows against cut-off:

Revetment from A to B	$13,500
Levee from C to D	11,250
Revetment from E to F	5,250
Total	30,000

He is of opinion, however, that the only work justified at this time is the construction of a revetment from A to B at an approximate first cost of $14,000 and $600 per annum for maintenance. He believes that the cut-off in question, if actually accomplished, would have little or no detrimental effect upon the general navigation of the river. There is no river commerce of a general nature to the port of Devall Bluff, though there is a small local water-borne commerce. The products from the factories and sawmills are transported by rail, and it is the opinion of the district officer that the benefits to be expected from preventing the isolation of this town, so far as general commerce is concerned, will consist in the continuance of freight-rate control, due to the maintenance of a navigable channel to the town. He is of opinion that this phase of the matter would justify reasonable expenditures, especially if supplemented by local interest and contribution.

2. As a result of the district officer's investigation of the subject of local cooperation, the industrial league at Devall Bluff has agreed to contribute the sum of $6,000 and to furnish free stumpage of brush toward the construction of the revetment from A to B. The district officer states that the expenditure of $14,000 will effectually prevent the cut-off and provide for all work in which the Federal Government would have any responsibility or interest, and he therefore recommends an appropriation of $8,000, to be available only upon contribution of the sum of $6,000 by local interests. The division engineer concurs in the opinion of the district officer.

3. The result of the survey indicates that the cost of the work necessary to prevent the threatened cut-off is not large, and while the work would hardly be justified solely at the expense of the United States, some benefits to commerce will result from the improvement, and in view of the reasonable measure of cooperation promised by local interests, the board concurs with the division engineer and district officer in the opinion that it is advisable for the United States to undertake the construction of a revetment from A to B, as indicated on the accompanying tracing. The sum of $8,000, being the full share of the cost to be borne by the United States, should be provided in one appropriation, contingent upon local cooperation to the extent indicated above.

4. In compliance with law, the board reports that except as contemplated by the above recommendations, there are no questions of

terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

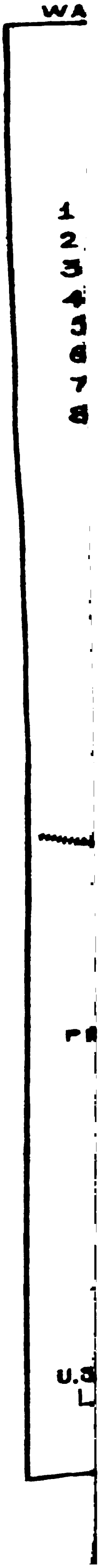
PRELIMINARY EXAMINATION OF WHITE RIVER AT DEVALL BLUFF, ARK.

Engineer Office, United States Army,
Little Rock, Ark., September 8, 1911.

Sir: (1) I have the honor to submit the following report upon a preliminary examination of White River, at and near Devall Bluff, Ark., with a view to improvement for navigation and the revetment of the banks in cooperation with local interests, this examination having been provided for in the river and harbor act of June 25, 1910.

(2) The conditions at Devall Bluff, Ark., giving rise to this call for a preliminary examination there are, first, a threatened cut-off by the river through a narrow neck of land about one-half mile east of the town of Devall Bluff, and, second, a sliding bank along the downstream half of the town front.

(3) A general survey of White River made in 1885 and 1886 gives the width of this neck shown at A on the accompanying sketch as 310 feet at that time. In 1897 it was 235 feet wide, having narrowed 75 feet in 11 years, and in 1902, 200 feet wide, having decreased 35 feet in 5 years. The width across had diminished to 140 feet in the autumn of 1910, or 60 feet in the last 8 years. These figures indicate a very uniform rate of erosion, the average being about 7 feet per annum. A narrow sand bar has formed on the downstream side of the neck and at its narrowest part, indicated on the map at point marked "E," the width of firm soil is now about 120 feet. The main body of the narrow strip of land, while not a true clay, is a heavy tough soil not easily washed by water flowing along or over it. About 1872 a ditch was cut across the neck in an effort to make the river change its course, but this ditch never enlarged any until recently and at one time was nearly obliterated. The surface of the neck is submerged to approximate depths of 4.5 feet and 2 feet at maximum and ordinary high waters, respectively, and until about 4 years ago there was no marked tendency to scour across the neck. The last two high waters, however, have eroded holes in the ground surface and enlarged the ditch. The high waters rising just above the "bank-full stage" are the most liable to cause surface erosion, since in the higher floods the direction of the current is in a more easterly direction and not squarely across the neck at the narrowest place. At the very high stages the current in the bend along the town front is comparatively gentle. The difference in water elevation on the two sides of the neck at low water period is 0.3 of a foot.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(4) The sliding of the bank at Devall Bluff is a condition which has existed for many years. A bar now protects the river front as far down as the location of the Ayer-Lord Tie Co. derrick at the point marked "3" on the sketch, but downstream therefrom the sliding continues. The bank is 24 to 28 feet above low water from the point marked "1" to point marked "5," from whence downstream it increases in height to 55 feet and then decreases to 22 feet above low water at D. The bank is not eroded much by the current flowing along it, but when the river has fallen to a medium or low stage after high water a strip of the bank which may vary in width and length up to 10 feet and 700 feet, respectively, may sink vertically downward from 2 to 5 feet, independently of that portion of the bank lying between the bank's crest and the river; the newly settled portion and the portion between it and the river then continue to sink, but at a very slow rate. The displacement of the moving material outward toward the river is very small, being possibly at the rate of 2 feet a year, while the recession of the crest of the bank averages 7 to 9 feet a year. Wells drilled in the town indicate strata of red clay, blue clay, and sand, in the order mentioned, from the surface downward. The blue clay varies in thickness from 6 to 20 feet and may be seen along the water's edge when the river is at 2½ to 3 feet above low water. The cause of the settling of the bank along the town front may be the movement of the material from the sand stratum as the ground water flows out into the river when the latter falls to a low stage. In a report on this subject, from which much of the data herein have been obtained, Assistant Engineer Van Frank, jr., states:

> A similar settlement of ground from a like cause is noted out on the rice prairies west and southwest of Devall Bluff. Most of the rice wells are equipped with 6 or 8 inch centrifugal pumps. The wells are drilled into the water bearing sand. This sand is so very fine that is is drawn through the sand points on the well pipes and carried out with the water from the wells. After a well has been in operation for some time the space made by this movement of sand becomes so large that the arch effect of the overlying soil is not strong enough to support the soil, then an irregular shaped area, approximately circular and 25 to 60 feet in diameter, drops vertically downward into the space. Many wells have been ruined by this action.

Soundings along the town front show the subaqueous slopes to be 1 on 1 or 1½. The sliding bank has a nearly vertical face along its crest, and lower down its slope is 1 on 2 or 3.

(5) A cut-off by the river across the neck opposite Devall Bluff would affect adversely the access to the new channel by some of the woodworking plants along the city front and would probably necessitate their moving if further easy transportation to and from the river were desired by them. The town would still be able to use the river by establishing a landing about half a mile eastward and constructing a highway thereto, but the lake formed by the cut-off in the river would be objectionable on account of its unhealthiness. Since the distance around the bend is only about 1 mile, the effect of a cut-off on the navigable capacity of the river would be of little or no importance. On account of the character of the sliding bank along the city front, revetment to prevent a continuation of this action would be rather expensive should the channel remain in its present location. On the other hand, the cut-off across the neck would probably improve conditions at the sliding bank along the town front.

(6) To prevent the cut-off a revetment along the up and down stream sides of the neck and a levee along its axis will be necessary

and to arrest further sliding of the bank along the town front some rather heavy mattress work will probably be the most effective.

(7) Devall Bluff is a town of 924 people according to the last census. In reference to the commercial importance of the project, no packet boat or general freighting by river into and out of the town is reported. Three woodworking plants are now in operation along the water front: One, a boat oar and shuttle block factory, located at the point marked "4" on the accompanying sketch, is stated to have received by river about 336,000 feet (1,008 tons) of ash and 300 or 400 tons of persimmon logs during the calendar year of 1910; another, a sawmill situated at 8 on the same sketch, about 535,000 feet (1,605 tons) of logs during the same period; and the third at 1, a planing mill which has not received any material by river for about two years. A factory located at the point marked "2" on the plat receives by water mussel shells amounting to about 400 tons annually for the manufacture of button blanks. The river commerce connected with these plants seems to constitute about all which now centers at the town and no information in regard to further prospective commerce has been received. No terminal or transfer facilities other than the Tie Company derrick already mentioned exist or are contemplated as far as any data has been secured; the development and utilization of water power is not involved in this project and no other subjects properly connected therewith at present suggest themselves.

(8) In reference to cooperation by the local interests, a resolution by the Industrial League of the town of Devall Bluff, dated August 1, 1911, a copy of which is attached hereto, contains the following:

> Therefore be it resolved, that we the business men of Devall Bluff, by and through its Industrial League, express ourselves as earnestly and unanimously in favor of the United States Government taking whatever steps might be necessary to prevent said cut-off and caving of the bluff, and urge that said work be done as soon as possible. And to assist in said work and improvement the league and citizens of Devall Bluff will undertake to raise one-third of the whole amount necessary to prevent the cut-off east of Devall Bluff, and to prevent further caving along the banks at Devall Bluff.

(9) While a plan to fix and maintain the water front and the river channel in its present location at the town of Devall Bluff, involves some favorable features such a project in the interest of navigation of the river would, even with the proposed local cooperation, be comparatively costly, considering the prospective benefits to commerce, and in my opinion it is not worthy of being undertaken by the General Government.

(10) A list [1] of names of persons who have been notified that an adverse report has been rendered is forwarded herewith.

Very respectfully, your obedient servant,

CLARKE S. SMITH,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

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[1] Not printed.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., September 12, 1911.

1. Respectfully forwarded to the Chief of Engineers, United States Army.

2. It is not the belief of the division engineer that we should so lightly allow this cut-off to occur. There are many bends in the White River above and below this point, and the ultimate effect of this cut-off may be far-reaching.

3. Whether the local interests would join in the expense of preventing the cut-off alone does not appear. If they will, I believe the General Government would be justified in undertaking this part of the work.

4. Regarding the protection of the bank in front of the town, the recommendations of the district officer are concurred in. This part of the work is so far removed from any benefit to navigation that it should not be undertaken by the General Government.

CHAS. L. POTTER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, March 11, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The object of the improvement contemplated by the item of law calling for this investigation is to prevent a cut-off opposite the town of Devall Bluff and to arrest the caving of the banks along the front of the town. In connection with this subject consideration is to be given to cooperation with local interests.

3. It appears that there is very little commerce on the river at this locality and that general navigation would not be directly benefited by the improvement to a very material extent. It is well known, however, that cut-offs in alluvial streams are a source of disturbance to the general regimen of the river, often resulting in injurious effects for many miles. In this respect the prevention of the cut-off would be beneficial to commerce and navigation to an unknown extent. The prevention of the gradual caving of the bank on the town front can have but little if any influence on navigation, and, except as incidental to or a part of a larger plan of improvement, does not appear to be of grave importance to general commerce.

4. By resolution, the Industrial League of the town of Devall Bluff proposes to raise one-third of the whole amount necessary to prevent the cut-off and to prevent further caving along the banks at Devall Bluff. The district officer states that even with this proposed local cooperation the improvement, in his opinion, is inadvisable. The division engineer agrees with the district officer in respect to the protection of the bank in front of the town, but states that if local interests will join in the expense of preventing the cut-off he believes the General Government would be justified in undertaking this part of the work.

5. As a result of the district officer's notification of his unfavorable report, Hon. James P. Clarke, United States Senator, came before the board on March 4 in behalf of those interested. He requested that consideration be given to the advisability of the United States preventing the cut-off, leaving the protection of the bank in front of the town to the community if in their interest it was found necessary to do so.

6. In order that all the facts may be placed before Congress and that local cooperation may be fully considered, which can only be done satisfactorily when the cost is known, the board believes an estimate should be prepared and that this is necessary to determine the advisability of the work as a whole or in part in connection with local cooperation. It is therefore recommended that such survey be authorized as is necessary for the purposes of estimate. Separate estimates for the work of preventing the cut-off and for protecting the town front should be given. It is requested that the district officer ascertain if local interests will share in the work of preventing the cut-off alone; and if so, to what extent.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, March 18, 1912.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of White River at and near Devall Bluff, Ark., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

Edw. Burr,
Acting Chief of Engineers.

[Fifth indorsement.]

War Department, *March 19, 1912.*

Approved as recommended by the Acting Chief of Engineers.

Robert Shaw Oliver,
Assistant Secretary of War.

SURVEY OF WHITE RIVER AT DEVALL BLUFF, ARK.

ENGINEER OFFICE, U. S. ARMY,
Little Rock, Ark., September 24, 1912.

From: Maj. E. M. Markham, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Survey of White River at and near Devall Bluff, Ark.

1. In compliance with the requirements of letter dated March 21, 1912, the following report and recommendation is submitted relative to the prevention of a cut-off through the narrows opposite the town of Devall Bluff, Ark.; there also accompanies tracing showing conditions found to exist by survey July 29, 1912, and letter of the Industrial League of Devall Bluff quoting resolution of the said league to the effect that the town will provide the sum of $6,000 and furnish material for mat construction as the local contribution toward the work.

2. To fully protect the narrows opposite Devall Bluff against cut-off, the following work at the estimated cost named will be required (see map herewith for position and limitation of work indicated):

Revetment from A to B	$13,500
Levee from C to D	11,250
Revetment from E to F	5,250
Total	30,000

The survey of July, 1912, however, shows that no appreciable caving has occurred on either side of the narrows since November, 1910. In other words, its condition has remained practically unchanged during the last two high-water periods. Moreover, there is no apparent tendency toward surface scour across the narrows during high-water flow. The one noticeable change in surface conditions has been a slight enlargement of an incipient high-water channel across this neck at "H." This is said to have originated in a ditch dug about 1878–79 by private parties desirous of effecting cut-off at that time. Steps have been taken to prevent further enlargement of this ditch pending action on this report.

3. Personal examination of this locality was made on September 16, 1912, when a meeting was had with representatives of the Industrial League of Devall Bluff, involving a thorough discussion of all phases of the matters in question, as a result of which I am of opinion that the only work justified at this time is the construction of a revetment from A to B, at a probable cost of about $14,000. The maintenance cost of such revetment would be about $600 per year, not annually required, but cumulative; that is to say, repairs may not be needed for several years, but when necessary the probable cost will be that which would accumulate at about $600 per year. The initial appropriation, if favorable action be taken upon this report, should be sufficient to complete the work in one season.

4. The cut-off in discussion, if actually accomplished, would have little or no detrimental effect upon the general navigation of the White River, since the increased slope involved would be approximately three-tenths of 1 foot. The result of such cut-off, of course, would be the isolation of the town of Devall Bluff from the river, and

the prevention of such isolation would appear to be the one element of justification for Federal expenditure.

There is no river commerce of a general nature to the port of Devall Bluff. Such commerce as exists is confined to the transportation of mussel shells for the supply of a button factory, saw logs for sawmills, and a boat-oar factory, and railroad ties. The latter, as well as the products of the factories and sawmills, is despatched from Devall Bluff by rail. The local river commerce during the past year was as follows:

	Tons.
Saw logs	2,438
Mussel shells	800
Railway ties	1,000

This tonnage alone would scarcely seem to warrant Federal expenditure, though understanding the policy of the General Government to be the maintenance of navigable rivers to their bank towns as a matter of freight-rate control, I am of the opinion that this phase of the matter would justify reasonable expenditure, especially so if supplemented by local interest and contribution.

As a result of discussion along these lines with the Industrial League of Devall Bluff, the latter agrees to contribute $6,000 and free stumpage on the brush toward the construction of revetment from A to B, and certain incidental surface work, the total cost of which is estimated at $14,000. The expenditure of this sum would effectually prevent cut-off and provide for all work as to which the Federal Government could have any responsibility or interest.

I would therefore recommend an appropriation of $8,000, based upon the condition (which should be written into the appropriation act), that the town of Devall Bluff contribute $6,000, the said appropriation to be available only upon deposit of the said $6,000 to the credit of the constructing officer in such depository as may be designated by the Secretary of War.

5. No estimate of cost for protecting the town front from I to J is submitted, as such work has no bearing upon navigation interests. The bank throughout this front does not cave. Although it is called a sliding bank, its action is peculiar in that it does not slide, but rather sinks during low-water periods only, and with a movement of nearly vertical subsidence. Trees and other objects remain upright during all movements from their high-bank level to their final position below low water. This condition manifestly results from the washout of some deep sand stratum, and could probably not be effectively controlled by any type of brush revetment construction, but would rather require some form of structure at the base of the slope of sufficient depth and weight to resist the thrust of the bank, whose maximum height in this locality is about 55 feet above low water. Any scheme devised to provide against this condition of subsidence would necessarily be at a very large cost.

6. The question of terminal and transfer facilities and development of water power is not involved in this improvement.

E. M. MARKHAM.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., October 4, 1912.

To the Chief of Engineers, concurring in the opinion of the district officer as expressed in paragraph 4.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

[For Report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

LETTER OF INDUSTRIAL LEAGUE OF DEVALL BLUFF, ARK.

DEVALL BLUFF, ARK., *September 21, 1912.*

DEAR SIR: At a meeting of the Industrial League of this place held last night the following resolution was passed:

Whereas what is known as the "Cut-off," east of town, has cut through the bend of the river until it is a question of a very short while when our town will be cut off from the river and from navigation, and an old river or lake formed; and

Whereas the engineer of the United States Army in charge of this territory has agreed that if the town will put up $6,000 of the amount required to put revetting, furnish willow stumpage, etc., and stop the cutting across from channel to channel, that he will recommend that the Government furnish the balance and do said improvement; and

Whereas, while we feel that the payment of such sum is a heavy toll upon the town, yet for the salvation of the town we feel that we are necessarily forced to stand same: Therefore be it

Resolved by the Industrial League of the town of Devall Bluff, That the said town pay the sum of $6,000 and furnish material sufficient for the matting for said work; and, further, that whenever we are assured by the Government or its authorized officers that it is ready to do said work, that this league, either through its town council or by public subscription, raise said sum of money, to be deposited subject to the orders of the Government, to be used in said repairs, and secure the necessary willow for the matting.

Yours, very truly,

INDUSTRIAL LEAGUE OF DEVALL BLUFF,
By T. N. GAY, *Secretary.*

Maj. E. M. MARKHAM,
Corps of Engineers.

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62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1260.

FRANKFORD CREEK, PA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE ACTING CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF FRANKFORD CREEK, PA.

JANUARY 10, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 8, 1913.

SIR: I have the honor to transmit herewith a letter from the Acting Chief of Engineers, United States Army, dated November 7 last, together with copies of reports from Maj. Herbert Deakyne, Corps of Engineers, dated September 1, 1910, and October 14, 1911, with map, on preliminary examination and survey, respectively, of Frankford Creek, Pa., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 7, 1912.

From the Chief of Engineers.
To the Secretary of War.
Subject: Preliminary examination and survey Frankford Creek, Pa.

1. There are submitted herewith, for transmission to Congress, reports dated September 1, 1910, and October 14, 1911, by Maj. Herbert Deakyne, Corps of Engineers, on preliminary examination

and survey, respectively, of Frankford Creek, Pa., authorized by the river and harbor act approved June 25, 1910.

2. This creek is a tributary of the Delaware River located within the limits of the city of Philadelphia. It is about 5 miles long, 60 to 100 feet wide, and its present depth is from 0 at the head to about 7 feet at the mouth. The improvement at first desired was the widening, straightening, and deepening the creek so as to provide a navigable channel 8 or 10 feet in depth, but it was later stated that a channel 6 feet deep at mean low water from the mouth to Wakeling Street would be satisfactory. This latter improvement would cost, as estimated by the district officer, $9,000 for first construction and $2,000 annually for maintenance.

3. The district officer states that conditions appear to warrant improvement, but it is not apparent that this improvement should be undertaken by the United States. He places this in the same class with the Schuylkill River, the improvement of which was assumed by the city of Philadelphia some years ago. Investigation was made as to the practicability of securing local cooperation, but neither the city of Philadelphia nor parties in interest along the creek are willing to contribute anything toward the improvement. The district officer is of the opinion, which is concurred in by the division engineer, that the present and prospective commerce on this creek is sufficient to warrant its improvement, but for the reasons given in his report he believes that the work should be done by local interests and not by the United States.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 9, 1912. The board held a public hearing at its offices in this city and later gave a hearing to a delegation of citizens from the locality, and after careful consideration of all the facts in the case, concurs with the district officer and the division engineer in the opinion that the improvement of this locality, while apparently desirable, should be at the expense of local interests and that it is not advisable at Federal expense.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress I report that the improvement by the United States of Frankford Creek, Pa., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

H. TAYLOR,
Lieut. Col., Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 9, 1912.

Respectfully returned to the Chief of Engineers, United States Army.

A survey having been made of this creek, the district officer reports that the improvement desired is a channel 6 feet deep at mean low water from the mouth to Wakeling Street, a distance of about 4,600 feet. Owing to the narrowness of the stream a width of 75 feet only can be given, which, however, the district officer believes would accommodate the navigation that would be possible with the proposed depth.

Investigation was made as to the practicability of securing local cooperation, but neither the city of Philadelphia nor parties in interest along the creek are willing to contribute anything toward the improvement. The district officer adheres to the opinion expressed by him in his report on the preliminary examination that the present and prospective commerce on this creek is sufficient to warrant its improvement, but for reasons given the work should be done by local interests and not by the United States.

On November 2 a delegation of citizens from the locality, in response to the district officer's notification of his unfavorable report, appeared before the board to urge the improvement by the United States, stating that they did not wish to have this stream made a subject of discrimination or selected as a precedent in the establishment of a policy requiring the locality to undertake improvements of this character.

It appears from references made within that there are many localities where improvements largely for the benefit of local interests have been made, in whole or in part, at local expense, and that if a similar requirement is imposed in this case it would not be establishing a precedent. The improvement desired here appears to be largely in the nature of a terminal or auxiliary channel to connect with the larger channel provided at great cost by the General Government, and the board concurs with the district officer and the division engineer in the opinion that this work, while apparently desirable, should be done by local interests and that it is not advisable at Federal expense.

In compliance with law, the board reports that there are no questions of water power or other subjects so related to the improvement proposed as to render it advisable in the interests of navigation.

For the board:

W. C. Langfitt,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF FRANKFORD CREEK, PA.

United States Engineer Office,
Philadelphia, Pa., September 1, 1910.

Sir: In compliance with instructions dated August 4, 1910, I have the honor to submit the following report on preliminary examination of Frankford Creek, Pa., called for by the act of Congress approved June 25, 1910:

The examination was made August 24, 1910. A map[1] of Philadelphia, Camden, and vicinity is forwarded herewith, showing the location of the creek and its relation to adjacent territory.

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[1] Not printed.

Frankford Creek is a tributary of the Delaware River, entering on the Pennsylvania side about 6 miles above the foot of Market Street, Philadelphia. The creek is formed by the junction of Tacony and Wingohocking Creeks, has a total length of about 5 miles, and is a tidal stream for about 3 miles above its mouth. The creek is navigable for vessels of small draft near its mouth and for rowboats as far as the head of tidal influence. Above this point it is a small drainage watercourse with considerable fall and is not navigable.

At and near the mouth the creek has a width of about 100 feet and a depth of 4 to 7 feet at mean low water. The width and depth decrease gradually as the creek is ascended until the head of navigation is reached, where the width is about 60 feet and the depth practically 0 at mean low water. The creek is crossed by a number of bridges, as follows:

A railroad bridge at the mouth.

A highway bridge at Bridge Street, one-half mile above the mouth.

A highway bridge at Orthodox Street, 1 mile above the mouth.

A railroad trestle bridge between Tulip and Roxborough Streets, about 2 miles above the mouth.

A railroad trestle bridge about one-fourth of a mile below the head of navigation.

A railroad masonry bridge with two arches about one-eighth of a mile below the head of navigation.

A highway bridge at Frankford Avenue, which is considered the head of navigation.

Two footbridges between the last two bridges just mentioned.

The first three of these are drawbridges; all the others are fixed bridges.

In accordance with the act of March 3, 1881, a survey of this stream from its mouth to Frankford Avenue was made in 1881 by Capt. William Ludlow, Corps of Engineers, and report thereon was submitted January 25, 1882. This report states that in its original condition the creek afforded good facilities for navigation, but that it had become so impaired by natural causes and faulty shore and bridge structures that only the lower portion was of any value for purposes of navigation. The tidal range was found to be 5.7 feet at the mouth and 4.4 feet at the Pennsylvania Railroad bridge, about one-eighth of a mile below Frankford Avenue. A plan was submitted for the improvement of the creek to a width of 50 feet and a depth at low water varying from 7 feet at the mouth to 3 feet at Frankford Avenue, at an estimated cost of $40,000. The act of August 2, 1882, appropriated $10,000 for the work. This was expended in removing 35,178 cubic yards of material, giving a depth of 7 feet at mean low water and a width of 50 feet or more from the mouth to the horseshoe bend above Bridge Street. In 1884 the Chief of Engineers reported that the creek was being regulated by the city of Philadelphia and recommended that no further appropriation should be made by the United States.

The act of August 17, 1894, appropriated $2,000 for straightening Frankford Creek between Tulip and Roxborough Streets. This was intended to be used in making a cut-off to enable the Pennsylvania Railroad to construct its approach to the Delaware River bridge at Philadelphia without crossing the creek. The district officer reported that the contemplated work had never been recommended or considered by the Government; that it would be of no benefit to navigation unless the improvement was extended from Orthodox Street to Frankford Avenue, and that, considering the large outlay required and the difficulty of maintenance, the work was not justified by the prospective commerce. The cut-off was finally made by the railroad, and the money appropriated by the United States was returned to the Treasury.

At present the creek is in a deteriorated condition. The tidal range at the mouth probably remains about the same as found in 1881, but near the head of navigation the range appears to have been reduced by deposits of silt and refuse from establishments along the stream. The creek is also the outlet for the sewage from a large area. Bulkheads are needed for the protection of the banks. Navigation appears to be confined almost entirely to that portion of the creek between the mouth and Orthodox Street and is carried on by schooners and barges of light draft.

Both banks of the stream along this portion are well occupied by various industries. The Frankford Arsenal occupies a large area on the north side of the creek and is engaged largely in the manufacture of small-arms ammunition. The other principal industries are the manufacture of chemicals, paper, leather, chain, forgings, and haircloth, and the handling of lumber, stone, sand, and coal. The capital invested in these enterprises is reported to be about $6,850,000. In the vicinity of the head of navigation and above that point there are other groups of industries, but they are beyond the reach of probable improvement at this time and are not taken into consideration in the discussion.

The following statement of the commerce on Frankford Creek for the year ending December 31, 1909, has been compiled from statistics furnished by the various industries along the creek:

Articles.	Tons.	Value.
Lumber	9,300	$139,500
Other building material	29,975	32,972
General merchandise	3,900	390,000
Chemicals	26,600	256,191
Coal	27,000	84,500
Miscellaneous	800	80,000
Total	97,575	983,163

The commerce is practically all incoming, as almost all outgoing freight from the various establishments is shipped by rail. Lumber is brought on barges from southern ports to Philadelphia, where the barges are partly unloaded, reducing their draft so that they can enter Frankford Creek with the remainder of their cargo. Coal is brought from the mines to Philadelphia by rail and taken from the coal piers to the creek by barges. Chemical supplies are lightered to the creek from deep-draft vessels in Philadelphia Harbor.

Persons engaged in business in the vicinity of the creek have been consulted and requested to express their views upon the proposed improvement. The replies received indicate that the improvement desired is the deepening and widening of the channel and the straightening of the bends in the creek. The depth desired is about 8 to 10 feet at mean low water, with suitable width for barges of about 10 feet draft. If the improvement were carried to the head of navigation, the fixed bridges between that point and the mouth would have to be provided with draws or spans of sufficient width and height to permit the passage of the small tugs required for handling the barges. Means would also have to be supplied for opening the bridge at Orthodox Street, which has a draw span but is not equipped with operating machinery.

The prospective commerce consists of freight now shipped or received by rail, which could be carried advantageously by water with an improved channel. The statistics collected from various industries give the additional commerce that would result from the improvement, as follows:

Articles.	Tons.	Value.
Chemicals	4,794	$105,929
Coal	20,000	80,000
Creosote	2,500	40,000
Curled hair	8,000	80,000
General merchandise	2,000	300,000
Oils	1,750	30,000
Steel billets	1,500	25,000
Waste paper	5,000	30,000
Wood pulp	7,000	70,000
Total	52,544	760,929

This would make the total of the present and prospective commerce about 150,000 tons, valued at about $1,750,000. It is stated that the possibility of navigating the creek causes a saving of 10 to 15 cents per ton on coal and 35 to 40 cents per ton on sand, gravel, and broken stone, as compared with rail shipment. The improvement of the creek is expected to allow shipment in larger vessels, resulting in increased saving.

There is a large amount of vacant land along both sides of the creek above Orthodox Street Bridge which could be developed into manufacturing sites, but so far as known there are no definite plans for such development, and no prospective commerce is credited to that source.

With reference to terminal and transfer facilities, it may be stated that there is no public wharf on the creek. There is a wharf on United States property at the Frankford Arsenal, but it is not open to the public. The other establishments handle their freight on the bank of the creek, in most cases along bulkheads. It would be possible to construct wharves on the banks of the creek at the ends of streets, but the streets which have been opened are provided with bridges, leaving no space for wharves. The facilities for transfer from rail to water have not been specially developed, but there are railroad lines on both sides of the creek and there would be no difficulty in providing such facilities. The improvement of the creek bears a relation to the question of land reclamation, as the material removed from the creek could be used to advantage in building up low land along the banks. The creek is subject to floods of considerable height at and above the head of navigation. There are no questions of water power relating to the navigable portion of the creek.

Considering the size of the stream Frankford Creek has considerable commerce and it is probable that a large increase would result from proper improvement. Conditions appear to warrant improvement, but it is not apparent that this improvement should be undertaken by the United States. Frankford Creek lies wholly within the limits of the city of Philadelphia, and the question of its improvement is similar in some respects to that of the improvement of the Schuylkill River, the navigable portion of which also lies entirely within the city limits. Some years ago the city government offered to make all necessary improvements on the Schuylkill River, since which time the United States has ceased to carry on the improvement of this stream. The Schuylkill has a much larger commerce than Frankford Creek and the commerce is much more general in its nature, a large part of it being foreign trade. The commerce of Frankford Creek is local, consisting mostly in the transfer of freight from points in Philadelphia Harbor to the creek, and any improvement would be chiefly of local benefit. The city of Philadelphia has a department of wharves, docks, and ferries, and is purchasing an extensive dredging plant to be used in the improvement of transportation facilities. The improvement of Frankford Creek appears to be within the proper scope of operations to be undertaken by the city or other local interests.

For the above reasons I have to report that, in my opinion, Frankford Creek is not worthy of improvement by the General Government.

Very respectfully,
HERBERT DEAKYNE,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, September 3, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 19, 1910.

Respectfully returned to the Chief of Engineers, United States Army.

This creek is located within the limits of the city of Philadelphia. It is about 5 miles in length, about 3 miles being tidal. Its width is from 60 to 100 feet, and its present depth from 0 at the head to about 7 feet at the mouth. The district officer states that the improvement desired is widening, straightening, and deepening the creek so as to provide a navigable channel 8 or 10 feet in depth. The present commerce is reported as about 97,000 tons, and the probable increase, in case of improvement, about 52,500 tons. The district officer recognizes the extent and importance of this commerce and states conditions appear to warrant improvement, but it is not apparent that this improvement should be undertaken by the United States. He places this in the same class with the Schuylkill River, the improvement of which was assumed by the city of Philadelphia some years ago.

At the request of interested parties a hearing was given at the offices of the board on December 12, at which appeared Hon. J. Hampton Moore, M. C., and several gentlemen from the locality. Evidence was introduced regarding the general and interstate character of the commerce of the creek, and it was stated that local interests would be satisfied with an improvement extending up to Harrison Street, a distance of about three-fourths of a mile. It was further stated that the assumption of the improvement of the Schuylkill River by the city of Philadelphia some years ago did not in any way obligate or bind the city to improve Frankford Creek.

It appears that there is sufficient commerce on this stream to warrant a moderate expenditure for improvement of the channel either by the United States or local interests. In order that all necessary data may be available to determine whether the work should be undertaken, the board recommends that the district officer be authorized to make such survey as may be required for an estimate of cost covering that part of the creek below Harrison Street, and to ascertain what local cooperation may be expected, and report further as to the advisability of the desired improvement.

For the Board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, January 4, 1911.

Respectfully submitted to the Secretary of War.

This is a report on preliminary examination of Frankford Creek, Pa., authorized by the river and harbor act of June 25, 1910.

Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality (i. e., below Harrison Street), as proposed, be authorized.

W. H. Bixby,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

War Department, *January 5, 1911.*

Approved as recommended by the Chief of Engineers.

Robert Shaw Oliver,
Assistant Secretary of War.

SURVEY OF FRANKFORD CREEK, PA.

United States Engineer Office,
Philadelphia, Pa., October 14, 1911.

Sir: In compliance with instructions dated January 10, 1911, I have the honor to submit the following report on survey of Frankford Creek, Pa., called for by the act of Congress approved June 25, 1910. A report on preliminary examination of this stream was submitted September 1, 1910, and a survey of the stream from its mouth to Harrison Street was authorized by the Secretary of War on January 5, 1911.

The survey was made by Mr. L. D. Shuman, junior engineer, under the direction of Mr. John Meigs, assistant engineer. The results of the survey are shown on the tracing forwarded herewith.[1] The available depth at mean low water is as follows:

From the mouth to the Frankford Arsenal wharf, 3 feet.
From Frankford Arsenal wharf to Bridge Street, 2.8 feet.
From Bridge Street to Orthodox Street, 0.5 foot.
From Orthodox Street to Harrison Street, 0.2 foot.

The creek is very narrow, the width between banks being less than 100 feet in places. The mean range of tide is about 5 feet.

By consultation with interested parties it is found that when they requested a survey of the creek as far up as Harrison Street they were under the impression that Harrison Street crossed the creek about three-fourths of a mile above the mouth, instead of 1¾ miles, where it actually crosses. The improvement desired by these parties is a channel 6 feet deep at mean low water, from the mouth to Wakeling Street, a distance of about 4,600 feet. The possible width of such a channel is limited to 75 feet, as a greater width would involve excavation too close to existing wharves. It is believed that this width is sufficient to accommodate the navigation that would be possible with the proposed depth.

The cost of a channel 75 feet wide and 6 feet deep at mean low water, from the mouth to Wakeling Street, is estimated as follows:

Excavation, 78,000 cubic yards, at 10 cents per cubic yard	$7,800
Engineering and contingencies	1,200
Total	9,000

The maintenance of the channel is estimated at $2,000 per year. These estimates are based on the assumption that the material can be dredged by the hydraulic process and deposited on land adjacent to the creek. If any appropriation should be made for this stream it should be coupled with the condition that dumping ground for the material shall be furnished free of cost to the United States, and for the proper prosecution of the work the entire sum required for the improvement should be appropriated at one time. Some of the dredged material could probably be disposed of in filling low places in the Frankford Arsenal reservation, which lies north of the creek near its mouth. The Ordnance Department has had under consideration the dredging of a part of the creek in order to improve sanitary conditions, but no funds have yet been made available for the purpose. In its upper portion the creek is little more than an open sewer.

The report on the preliminary examination gives commercial statistics and other information bearing on the question of improving Frankford Creek. It is believed that no essential changes in commercial conditions have taken place since the date of that report. As a result of the preliminary examination, I expressed the opinion that commercial conditions warranted improvement, but that the work should be done by local interests rather than by the United States, for the reason that the creek lies wholly within the limits of the city of Philadelphia and its improvement would be chiefly of local benefit. The greater part of the commerce consists of the transfer of coal, building material, and other supplies from ships in Philadelphia Harbor or from points nearby on the Delaware River to points on Frankford Creek. It is claimed that some lumber from southern ports is shipped to Frankford Creek without rehandling. Possibly as much as 5 per cent of the commerce of the creek may consist of through lumber shipments of this kind.

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[1] Not printed.

The instructions for the survey require me to investigate and report upon the question of local cooperation. This has been done, and it is found that neither the city of Philadelphia nor the interested parties engaged in business along the creek are willing to contribute anything toward the improvement. The claim is made that to require local interests to improve Frankford Creek would be a discrimination against Philadelphia and would establish a harmful precedent. As to the matter of precedent, it may be stated that the precedent is already established by the action of the city of Philadelphia as expressed in a letter[1] addressed by the mayor to the Chief of Engineers on June 4, 1902, in which he stated that the city of Philadelphia was perfectly willing to make all the improvements in the Schuylkill River to enable vessels of deep draft to enter its waters, and that all the work required of the United States Government would be that in the Delaware River and Bay. Since that time the United States has ceased to provide for the improvement of the Schuylkill River.

With reference to discrimination against Philadelphia, attention is invited to the investigation made in 1909 by the board of officers appointed pursuant to the following provision in the river and harbor act of March 3, 1909:

> The Secretary of War is authorized to appoint a board of engineers to examine those harbors on the Great Lakes and elsewhere in which the whole or a part of the harbor is improved at local expense, which board shall make recommendations with a view to determining whether the improvements so made by local authorities should be undertaken or maintained by the General Government and to establishing uniform rules in making harbor improvements.

This board visited numerous localities, among them Philadelphia. Its report, dated December 18, 1909, and published as House of Representatives Document No. 1067, Sixty-first Congress, third session, enumerates 120 localities where harbor improvements have been made in whole or in part at local expense. These localities consist of 30 on the Atlantic coast, 10 on the Gulf of Mexico, 8 on the Pacific coast, 52 on the Great Lakes, 16 on the Mississippi River system, and 4 in the insular possessions. Special interest attaches to those of Boston, New York, and Baltimore, large shipping points on the Atlantic coast, handling the same kind of business as Philadelphia. With reference to Boston the board states that a large number of small harbors and channels have been improved at local expense. In New York Harbor it is shown that in the improvement of Gowanus Creek and Canal a portion of the canal has always been dredged by local authorities. As to Baltimore it is stated that the city takes care of the harbor within city limits, except that the General Government in recent years has improved the upper part of the harbor of Southwest Baltimore. It does not appear from these and the numerous other examples cited by the board that any discrimination against Philadelphia would be involved in requiring Frankford Creek to be improved at local expense.

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[1] Not printed.

The report of the board above referred to summarizes its conclusions, one of which is as follows:

> That the work of the Government at any harbor be confined to the general part of the harbor, including, as may be necessary, the construction and maintenance of breakwaters with the general anchorage area protected thereby, of entrance piers and jetties at the mouths of inner channels, and the portion of such channels immediately between them, and also of such long general channels of approach as may be necessary to connect the harbor with outside deep water.

Applying this principle to the case under consideration, it should be noted that the United States is engaged in providing a 35-foot channel from the sea to Philadelphia. This is well described as a long general channel of approach. Its estimated cost is $10,920,000, and it does not seem unreasonable that in connection with the development of terminal facilities the city or other local interests should improve Frankford Creek at an expense of about one-tenth of 1 per cent of the cost of the 35-foot channel. There are no special features in this case that warrant its being treated as an exception to the general principle quoted.

The amount of present and prospective commerce on the creek warrants the improvement of Frankford Creek as outlined above, but for the reasons given I am of the opinion that the work should be done by local interests and that the creek is not worthy of improvement by the United States.

Very respectfully,

HERBERT DEAKYNE,
Major, Corps of Engineers.

The CHIEF OF ENGINEERS, United States Army
(Through the Division Engineer).

[First indorsement.]

UNITED STATES ENGINEER OFFICE, EASTERN DIVISION,
New York City, October 23, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors on survey, see page 2.]

LETTER OF JOINT EXECUTIVE COMMITTEE ON THE IMPROVEMENT OF THE HARBOR OF PHILADELPHIA AND THE DELAWARE AND SCHUYLKILL RIVERS.

PHILADELPHIA, PA., *November 9, 1911.*

GENTLEMEN: This brief of the joint executive committee on the improvement of the harbor of Philadelphia and the Delaware and Schuylkill Rivers, representing the Philadelphia Board of Trade, Philadelphia Commercial Exchange, Philadelphia Maritime Exchange, Philadelphia Drug Exchange, Grocers' and Importers' Exchange, Philadelphia Chamber of Commerce, Philadelphia Bourse, Vessel Owners' and Captains' Association, Manufacturers' Club, Lumbermen's Exchange, and Master Builders' Exchange, respectfully represents—

That evidence has been presented to this joint committee that your honorable board has reached certain conclusions, as stated below, in dealing with the subject of river and harbor improvement by the Federal Government, especially in relation to the waters in which our committee is particularly concerned, that are at variance with the views held by this committee.

"That the improvement of navigable waterways lying wholly within the limits of a city should not be undertaken by the Federal Government for the reasons that their commerce is largely local in character; that any improvement would be chiefly of local benefit; that the United States is expending a large sum on the main channel from Philadelphia to the sea; that said improvement would be in the nature of the development of terminal facilities lying within the proper province of local interests; and that such work by local interests would be in conformity with the conclusions reached by the board appointed in accordance with the act of Congress approved March 3, 1909, to consider the question of establishing uniform rules in making harbor improvements."

That if the policy as outlined above is in force it would apply to the Schuylkill River, the navigable length of which is entirely within the city of Philadelphia; yet the export business of this river represents a very large percentage of the total export foreign trade of the port of Philadelphia.

The attitude assumed by a former mayor of this city in connection with the Schuylkill River improvement was without any legislative authority or sanction and was not indorsed by the maritime commercial interests of the port; and this committee concurs in the following views expressed by the chief engineer of the city in a report made to a later mayor under date of April 26, 1906:

"In offering to obligate the city to make improvements in the Schuylkill River to enable vessels of deep draft to enter its waters it is doubtful whether the ex-mayor, now deceased, had any thought of including maintenance in the word 'improvements,' for which the city of Philadelphia is in nowise equipped."

In order to show that the reference to Schuylkill River improvement, made by the mayor of Philadelphia in 1902, was without the knowledge and approval of those most directly interested, the following quotation is made from a letter addressed by Congressman Henry H. Bingham, of Philadelphia, under date of December 13, 1906, to the Hon. Theodore E. Burton, then chairman of the Rivers and Harbors Committee, in answer to a request from said chairman for "a submission of the projects which are of interest to the port of Philadelphia":

"The improvement of the Schuylkill River, which is a most important adjunct to the commerce of Philadelphia, should be continued, and to that end a survey and report of estimated cost for a further deepening of the river should be authorized."

This communication from Congressman Bingham was submitted to his colleagues from Philadelphia and was by them indorsed.

That this joint executive committee respectfully but earnestly protests against any discriminatory action on the part of your honorable board whereby certain rivers and streams are included in the Federal improvement of waterways while others are excluded without good and convincing evidence of the justice of its action.

That this committee holds that control of navigable waters, which is asserted by the Federal Government, whether or not such waters lie wholly within the limits of a city or of a State, carries with it the obligation and responsibility of Federal care where the need has been established and works of improvement undertaken, maintenance of such improvements attaches as a necessary corollary.

All of which is respectfully submitted.

George E. Bartol, *Chairman.*
W. R. Tucker, *Secretary.*

The Board of Engineers for Rivers and Harbors.

SIXMILE CREEK, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF SIXMILE CREEK, FLA., INCLUDING CHANNEL AT THE MOUTH IN HILLSBORO BAY.

JANUARY 10, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 8, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 7th instant, together with copy of a report from Capt. J. R. Slattery, Corps of Engineers, dated September 6, 1912, on preliminary examination of Sixmile Creek, Fla., including channel at the mouth in Hillsboro Bay, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 7, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Sixmile Creek, Fla.

1. There is submitted herewith, for transmission to Congress, report dated September 6, 1912, by Capt. J. R. Slattery, Corps of Engineers, on preliminary examination of Sixmile Creek, Fla., including channel at the mouth in Hillsboro Bay, called for bv the river and harbor act approved July 25, 1912.

2. No previous examination has ever been made of Sixmile Creek. At the mouth of the creek the limiting depth is 3½ feet at mean low water, while a circuitous channel of about the same depth leads from the mouth to the 6-foot curve in the bay. The stream in its present condition affords a channel 5 feet in depth from its mouth to the county bridge, about three-fourths of a mile upstream; from thence to the head of navigation, a distance of about 3 miles, depths of 3 feet at mean low water and of 5 feet at high water are found.

3. The territory tributary to this waterway is now served principally from Tampa, involving an average haul by wagons of about 7 miles. Interested parties appear to desire an improvement of the stream in the belief that substantial saving in transportation costs will thereby be effected. For the reasons set forth in his report the district officer considers it very doubtful whether any saving could be effected at this time by the general use of the creek, and expresses the opinion that the locality is not now worthy of improvement by the General Government. In this opinion the division engineer concurs.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith dated October 14, 1912. Interested parties were notified of the unfavorable tenor of the district officer's report and afforded an opportunity of appealing therefrom, but no communications on the subject were received. The Board concurs with the district officer and the division engineer in the opinion that the locality is not worthy of improvement by the General Government at the present time.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Sixmile Creek, Fla., including channel at the mouth in Hillsboro Bay, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, October 14, 1912.

To the Chief of Engineers, U. S. Army:

1. Sixmile Creek is a stream of which no previous examination has been ordered by Congress. It has a length of about 4 miles and lies entirely in Hillsboro County, Fla. It appears that the limiting depth at the mouth of the creek is about 3½ feet at mean low water, with a circuitous channel of practically the same limiting depth to deep water in Hillsboro Bay. A 5-foot channel extends from the mouth about three-fourths mile upstream to the county bridge; thence for a distance of 3 miles to the head of navigation at the

rapids just below the Atlantic Coast Line bridge there is a channel having a minimum depth of 3 feet at mean low water. The tidal fluctuation is about 2 feet, and the creek therefore affords a 3-foot channel at low water and a 5-foot channel at high water. The width gradually decreases from 600 feet at the mouth to about 100 feet in the upper reaches.

2. The territory adjacent to the creek is reported to be fine truck land, and has been subdivided into small farms, but the district officer states that there is very little sign of cultivation at the present time. The total commerce of the locality is liberally estimated at about 1,846 tons, valued at $21,300. Though some use is made of the creek, the produce and supplies for the most part are transported to and from Tampa by means of wagons, the average haul being about 7 miles. Interested parties appear to desire an improvement of the stream in the belief that substantial saving in transportation costs will thereby be effected. The district officer points out, however, that in a haul of such short distance the cartage to and from the boat, with the rehandling of freight involved, would render it very doubtful whether any saving in cost of transportation could be effected at the present time by the general use of this creek. In view of the present lack of development, the consequent small amount of commerce to be cared for, the doubtful advantage of using the waterway for its transportation to the Tampa markets, and the really excellent channel afforded by the stream in its present condition, he is of opinion that the locality is not worthy of improvement by the General Government at the present time. In this opinion the division engineer concurs.

3. Interested parties were notified by the district officer of the unfavorable tenor of his report, and invited to submit statements and arguments to the board bearing upon the need for the improvement of the creek, but no communications relative to this subject have been received.

4. There does not appear to be any substantial need of additional navigation facilities on Sixmile Creek at the present time, and the board therefore concurs with the district officer and division engineer in believing that it is not advisable for the United States to undertake the improvement of this stream.

5. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SIXMILE CREEK, FLA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., September 6, 1912.

From: Capt. J. R. Slattery, Corps of Engineers, United States Army.
To: The Chief of Engineers, United States Army (through the Division Engineer).
Subject: Preliminary examination of Sixmile Creek, Fla.

1. In compliance with department letter, dated August 3, 1912, I submit the following report on the preliminary examination of Sixmile Creek, Fla., authorized by the river and harbor act approved July 25, 1912.

2. Sixmile Creek lies entirely within Hillsboro County, Fla. It is formed by the union of two creeks near the Plant City road, flows in a southerly direction for about a mile and a half, and then in a westerly direction for 2½ miles and empties into Hillsboro Bay. The total length of the creek is, therefore, about 4 miles. At the mouth of the creek there are limiting depths of 3½ feet at mean low water. A circuitous channel affording a depth of at least 3.2 feet at mean low water leads from the mouth of the creek to the 6-foot curve in the bay. On the shortest line from the mouth of the creek to the 6-foot curve in the bay, limiting depths of 2½ feet are encountered. These channels are shown on the map accompanying this report. Generally deeper water is found in the bay off the mouth of the creek than given by the Coast and Geodetic Chart. A 5-foot channel extends from the mouth of the creek to the county bridge. For a distance of 1½ miles above the county bridge there exists a channel generally four or more feet in depth with, however, a few spots with depths of 3 to 3½ feet. From this point to the head of navigation, at the rapids just below the Atlantic Coast Line bridge, there is a channel with minimum depths of 3 feet at mean low water.

3. The tidal fluctuation is about 2 feet, and the creek, therefore, affords a 3-foot channel at low water, and a 5-foot channel at high water throughout its length. The width of the stream near the mouth is about 600 feet, and gradually decreases to about 100 feet in the upper reaches.

4. The following bridges cross the stream: The county bridge, about three-quarters of a mile above the mouth, which is a drawbridge affording a clear channel 50 feet wide through the draw, and a head room of about 5 feet at high water under the closed draw; the Seaboard Air Line bridge, a steel girder, spanning the stream from bank to bank, and affording a head room of about 8 feet at high water, an old county bridge, with an opening about 24 feet wide and 8 feet high, provided for the use of navigation; and the Atlantic Coast Line bridge, just above the head of navigation. It was impossible to reach the bridge last mentioned, and any information concerning its span and clearance is not available.

5. No previous examination has ever been made of this locality.

6. The banks of the creek are generally high, and the country adjoining the creek is said to be fine truck land and capable of great development. On the map accompanying report, have been indicated the homes that have been established in the vicinity. Between 40 and

50 persons have purchased 5-acre farms in this vicinity, but there is very little sign of cultivation.

7. There is a letter[1] attached hereto from Mr. G. S. Van Burskirk outlining the development along the creek. From this letter[1] and likewise from the personal interviews with Messrs. Van Burskirk and W. G. Brorein, it appears that at the present time most of the produce of and supplies for this section are transported to and from Tampa by means of wagons. Some use, however, is made of the creek.

8. It has been impossible to obtain satisfactory information relating to commerce, but the following data deduced from Mr. Van Burskirk's statement is believed to be a liberal estimate of the commerce of the locality:

Articles.	Tons.	Value.
Cigars	1	$1,000
Fertilizers	20	600
Grain and hay	1,000	3,000
Lumber	600	7,700
Vegetables	225	9,000
Total	1,846	21,300

9. Those interested in the improvement are very vague as to what improvement they want, and there is apparently very little demand for any improvement, which is not surprising considering the very good channel already existing and the fact that the average haul to Tampa is only 7 miles. According to Mr. Van Buskirk's figures, it costs $3.33 to haul a ton of produce to Tampa, which is at the rate of $0.48 per ton mile. Mr. Van Buskirk figures that the cost per ton by the creek would be only $1 or about $0.14 per ton mile, but in reaching this figure he has not charged the cost of loading into wagons and delivering to boat, unloading from boat at the other end, loading again into wagons and hauling to destination. Considering the length of haul, and the fact that produce when placed in wagons does not have to be handled again until it reaches its destination, whereas if transported by boat, it would have to be handled at least once and possibly twice more, and would have to be hauled to the boat landing by wagon and away from the landing again by wagon, it is very doubtful whether any saving in cost of transportation could be effected at the present time by the general use of this creek.

10. There is no town on the creek, and there are no terminal facilities whatsoever. Wherever a house has been located near the creek, a landing has also almost invariably been built, but these landings are suitable only for persons landing from boats. No one was noticed on which a wagon could drive, so as to unload at a convenient point for loading into boats. If these landings were used for handling the freight, it would be necessary to handle the freight by hand between the boat and wagons on shore. No terminal facilities are believed to be necessary now, as it is simpler to haul produce to Tampa by wagon than to try to ship it by boat.

11. No water power could be developed and no land could be reclaimed, in connection with the improvement of this stream in the interests of commerce and navigation, so as to reduce the cost of such

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[1] Not printed.

improvements to the General Government. There are no other
jects that could be considered in connection with a plan for th
provement.

12. In view of the present lack of development along Six Mile C
the consequent small amount of commerce to be cared for, the d
ful advantage of using the waterway for its transportation t
Tampa markets, its immediate destination, and the really exc
channel afforded by the stream in its present condition, I am
opinion that the waterway is not worthy of improvement b
General Government at the present time.

13. Interested parties have been informed by letter[1] dated
tember 6, 1912, of this adverse report, and they have been requ
if they desire to do so, to submit their views to the Board of Eng
for Rivers and Harbors, Southern Building, Washington, D
within four weeks of date of same. A copy of this letter[1] and a
of the parties to whom it was sent are submitted herewith.

J. R. SLATTE

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
October 2, 19

Forwarded to the Chief of Engineers, United States Army.

I agree with the district officer in his opinion that this wat
is unworthy of improvement at this time.

DAN C. KINGMAN,
Colonel, Corps of Enginee

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[1] Not printed.

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62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1290.

MERMENTAU RIVER, LA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF MERMENTAU RIVER, LA., WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT, WITH A VIEW TO CONSTRUCTION OF A LOCK AND DAM TO MAINTAIN THE LEVEL OF GRAND LAKE AND THE INLAND WATERWAYS OF LOUISIANA.

JANUARY 21, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, January 20, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 18th instant, together with copies of reports from Lieut. Col. L. H. Beach, Corps of Engineers, dated June 10, 1911, and February 15, 1912, on preliminary examination, with plan and estimate of cost of improvement, respectively, of Mermentau River, La., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 18, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and plan and estimate of cost of improvement of Mermentau River, La.

1. There are submitted herewith for transmission to Congress reports dated June 10, 1911, and February 15, 1912, by Lieut. Col. L. H.

Beach, Corps of Engineers, on preliminary examination, with plan and estimate of cost of improvement, respectively, of Mermentau River, La., with a view to the construction of a lock and dam to maintain the level of Grand Lake and the inland waterways of Louisiana, authorized by the river and harbor act approved February 27, 1911.

2. Grand Lake, on the Mermentau River, is an enlargement of that stream, irregular in shape and having a length and greatest width of about 11 miles. It forms one of the links of the inland waterway now being constructed across southern Louisiana by the General Government and is used extensively as a source of supply of fresh water for irrigating the rice fields throughout this section of the State. To prevent the interruption of navigation by the north winds, which greatly affect the level of Grand Lake, it would be necessary, in the opinion of the district officer, who is also the division engineer, either to dredge to a greater depth than that projected for this section of the waterway or to construct a dam as contemplated in the provision of the act calling for this investigation. The district officer states that the dam would also have an incidental value in addition to its original purpose, as it will prevent the flow of salt water into Grand Lake.

3. The district officer presents a plan for a lock and dam located in the Mermentau River between Grand Lake and the Gulf of Mexico, designed to permit the closing of the channel at varying elevations, at an estimated cost of $173,000, and he is of opinion that owing to the benefit of the dam to the rice industry it is believed that the rice growers should contribute one-half its cost and pay half the cost of the lock force.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated April 8, 1912. Not being convinced of the necessity of this lock and dam in the interest of navigation, the board had those in interest so notified, which resulted in a hearing before the board attended by several in favor of the improvement, where the statement was made that local cooperation, as recommended by the district officer, did not seem practicable. A careful study of the subject leads the board to the conclusion that the effect of the lock and dam upon the navigation of the inland waterways of Louisiana would be merely local and limited to short periods of time of comparative infrequency, so that the benefits to commerce are not sufficient to justify the expenditure necessary for the construction. It is the opinion of the board, therefore, that it is not advisable for the United States to undertake the construction of a lock and dam in the Mermentau River at the present time.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Mermentau River, La., by the construction of a lock and dam to maintain the level of Grand Lake and the inland waterways of Louisiana in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON PLAN AND ESTIMATE OF COST OF IMPROVEMENT.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, April 8, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The item of law calling for this report contemplates the construction of a lock and dam to maintain the level of Grand Lake and the inland waterways of Louisiana. The location of the proposed lock and dam is in the Mermentau River, between Grand Lake and the Gulf of Mexico. The district officer states that Grand Lake is an important link of the inland waterway as at present adopted, and as the depths near the shores are shallow the maintenance of a constant level is desirable. He says that this level is now lowered at times by strong or protracted north winds, and that the primary object of the proposed dam is to prevent this lowering in the interests of navigation. The improvement is also strongly advocated by the rice growers in the Mermentau Basin, because of its being an important factor in keeping salt water from reaching Grand Lake and the Mermentau above, from both of which water is pumped in large quantities for irrigating rice lands. Salt water is injurious to the rice crop and any improvement that would keep it from these lands would be of great value to the community.

3. The district officer presents a plan for a lock and dam to cost $173,000, and states that owing to the benefit to the rice industry it is believed that the rice growers should contribute half the cost of the dam and pay half the cost of lock force.

4. Not being convinced of the necessity of this lock and dam in the interests of navigation, the board requested that interested parties be so advised and that they be given an opportunity of presenting their views. This resulted in hearing before the board on April 1, 1912, at which appeared Hon. Joseph E. Ransdell, M. C., Hon. Robert F. Broussard, M. C., and Messrs. Lock, Hathaway, and Caplin, all in favor of the improvement. Much stress was laid upon the beneficial effect the improvement would have upon the rice industry. It was stated, however, in reply to an inquiry by the board that local cooperation as recommended by the district officer did not seem practicable.

5. While the improvement contemplated would tend to maintain the level of Grand Lake and the Intracoastal Canal in the immediate vicinity, it would have no effect upon other sections of the waterway which have connections more or less direct with the Gulf, and which are subject to similar influences of winds and tides. A careful study of the subject leads the board to the conclusion that the effect of the lock and dam upon the navigation of the inland waterways of Louisiana would be merely local and limited to short periods of time of comparative infrequency, so that the benefits to commerce are not sufficient to justify the expenditure necessary for the construction. It therefore reports that in its opinion it is not advisable for the United States to undertake the construction of a lock and dam in the Mermentau River at the present time.

6. There are no questions of terminal facilities, water power, or other subjects that can be so coordinated with the improvement proposed as to render it advisable at the expense of the General Government in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF MERMENTAU RIVER, LA.

War Department,
United States Engineer Office,
New Orleans, La., June 10, 1911.

Sir: 1. I have to respectfully submit the following report of the preliminary examination of Mermentau River, La., with a view to construction of a lock and dam to maintain the level of Grand Lake and the inland waterways of Louisiana, which preliminary examination was referred to this office by letter from the Chief of Engineers, dated April 7, 1911.

2. Grand Lake, on the Mermentau River, is an enlargement of that stream, irregular in shape, and having a length of about 11 miles and a greatest width of about the same number of miles. It forms one of the links of the inland waterway or intracoastal canal being constructed across southern Louisiana under appropriations from Congress. The canals between Vermilion Bay and White Lake and White Lake and Grand Lake have been completed, and the contractor is now engaged in dredging in the shallow portions of the lakes near the shore. The canal has an authorized depth of 5 feet, but owing to the shallow water adjacent to the shores of Grand Lake it is necessary to extend this dredging some distance into this body of water. The level of the lake, as well as the levels of all the bayous along the Louisiana coast, is greatly affected by the wind; it is not uncommon during heavy northers of the winter to have these waters lowered from 2 to 3 feet in depth for several days at a time, and such lowering frequently occurs at other seasons for a period of one to two days. To prevent the interruption of navigation by these winds and to provide a 5-foot navigation at all times would require either that the canals be dredged to a depth of 8 feet and proportionally extended into Grand Lake, Flat Lake, and Vermilion Bay, or that some means of retaining the water be provided. Owing to the soft character of the muddy bottom of these bodies of water a channel 8 feet deep near the shore would be practically impossible to maintain, as the material would soon be washed into it by the waves. The only other alternative, therefore, if the canal is to pass through the lake, is to provide a lock and dam such as that contemplated by the clause requiring the examination. Such a lock and dam would not only be advantageous, but becomes necessary with a 5-foot canal if the 5-foot navigation is to be maintained at all times. The dam would serve incidentally to keep salt water from the lake, which is used very largely for irrigating purposes in connection with the extensive rice fields which exist in this part of Louisiana. Rice requires about 26 inches of water in this sec-

tion to insure a crop. It has been found by experience that 30 grains of chlorides to the gallon of water affect the rice injuriously, and as the salt is retained while the water evaporates or filters through the soil the matter is of vital importance to the rice-growing industry. The exclusion of salt water from the lake would be an incident of the improvement, but a very important one, as the rice culture along the line of the inland waterway will afford one of the principal items of commerce over it, and it would be unfortunate if the construction of the waterway for the purpose of assisting commerce should impair the principal industry of the locality and result in damage to the commerce which already exists.

3. It is believed that the locality is worthy of improvement in the manner contemplated, provided the work can be done at a reasonable cost.

4. No other survey is necessary, as one has already been made of the locality where the dam will be placed, as a feature of the intracoastal canal.

5. It will probably cost about $125 to make designs, draw plans, and make estimates of cost for a lock and dam suitable for the purpose. The locality is believed worthy of improvement to the extent of obtaining this information, and it is recommended that the sum stated, $125, be allotted for the purpose indicated.

Respectfully submitted.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, July 3, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The question of the advisability of constructing a lock and dam in the Mermentau River, with a view to maintaining the level of Grand Lake and the inland waterways of Louisiana depends largely upon the probable cost of the lock and dam, the extent of local cooperation that may be expected, and the suitability of the lock and dam proposed in case a new route or modified depth for the intracoastal waterway in this vicinity is adopted. The solution of these questions should be determined before an opinion is given as to the advisability of the improvement, and therefore the board recommends an allotment for this purpose. It further recommends that the inclosed copy of the board's report[1] of January 17, 1911, on this subject be sent to the district officer, with request for consideration of the points therein raised.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

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[1] Not printed.

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, July 13, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Mermentau River, La., authorized by the river and harbor act of February 27, 1911.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that preparation of a plan and estimate of cost of improvement of the locality, as proposed, be authorized.

EDW. BURR,
Acting Chief of Engineers.

[Fourth indorsement.]

WAR DEPARTMENT, *July 14, 1911.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF MERMENTAU RIVER, LA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New Orleans, La., February 15, 1912.

SIR: 1. I have to submit the following report, with general plan and estimates, for construction of lock and dam on the Mermentau River at the outlet of Grand Lake, for the purpose of maintaining water level of that lake.

2. Report of the preliminary examination for this locality was submitted by this office on June 10, 1911.

3. The object of the dam is twofold. First and primarily, to prevent the lowering of the water level of Grand Lake by strong or protracted north winds. This lake is an important link of the inland waterway as at present adopted, and as the depths near the shores are shallow, the maintenance of a constant lake level is of great importance. The dam will also have an incidental value in addition to its original purpose, as it will prevent the flow of salt water into Grand Lake. The lake is used extensively as a source of supply of fresh water for irrigating the rice fields throughout this section of Louisiana, and the exclusion of salt water has therefore an important influence upon the prosperity of this portion of the State, as well as an important effect on the commerce of the waterway. A small percentage of salt in the water becomes highly injurious, owing to the fact that the effect is cumulative, the water passing into the ground or being evaporated, while the salt remains. Thus, repeated applications of water with a certain amount of salt will injure or entirely destroy crops, when one or two floodings with the same water would be without harmful result.

4. The dam has been designed to permit the channel to be closed at varying elevations, and consists of a series of gates raised and

owered from a permanent operating bridge over the stream, the lock being at one end of this operating bridge. Owing to the fact that the ake can not rise more than a few feet on account of its low banks, he operating bridge can be kept at a comparatively low level, thus adding greatly to the economy of construction. The design shows each gate as made in two leaves, but consideration since the general plan was drawn would make it appear best to have each gate into hree sections. One of the principal objects of this is to overcome and prevent any danger of the level of the lake being lowered by water pumped from it for irrigation purposes. It has been the fear of many nterested in navigation that if the dam were closed and a heavy demand made upon the waters of the lake for irrigation purposes the water level might be appreciably depressed to such an extent as to nterfere with the navigable depths in the cuts near the shores. Mermentau River is a stream of considerable size. The inflow of salt water takes place during flood times, salt water running upstream beneath the fresh water which remains on top. During the ebb tide the fresh water on top runs out more freely than the salt water underneath. In this manner, during the season of low water in the river, the ebb and flow of tide acts, to a certain degree, as a pump to change the character of water in a reservoir like Grand Lake, salt water being added at each flood tide and fresh water being abstracted at each ebb tide. By closing the gates during flood tide the inflow of salt water will be prevented. Should large quantities of water be desired for pumping purposes any slight depression of the surface of the lake will tend to produce an upstream flow in the lower river, and by lowering the top leaves of the gates slightly below water level only the fresh water at the top will be able to pass the dam. This will not only prevent any lowering of the lake level, but also permit the inflow of only fresh water to supply that removed by the pumping plants. For this purpose a gate of three leaves is considered better than one of two leaves.

5. The estimated cost of the lock and dam is $173,000, detailed as follows:

Cofferdam	$16,000
Excavation, 20,000 cubic yards, at 50 cents	10,000
Back fill, 5,000 cubic yards, at 60 cents	3,000
Piles in lock foundation, 48,000 linear feet, at 40 cents	19,200
Piles in dam, 13,600 linear feet, at 40 cents	5,440
Sheet piles, 150,000 feet, at $60 per M	9,000
Timber in lock gates, 32,000 feet, at $125 per M	4,000
Timber in dam, 13,000 feet, at $100	1,300
Concrete, 3,750 cubic yards, at $15	56,250
Steel operating devices, etc	15,000
	139,190
Superintendence and inspection, 5 per cent	7,000
Contingencies, about 20 per cent	26,810
	173,000

6. Owing to the benefit to the rice industry, it is believed that the rice growers should contribute half the cost of the dam and pay half the cost of the lock force. It has been impossible to obtain a distinct, definite, or authoritative statement from the rice growers concerning the extent to which they are willing to cooperate, as there is no organization among them authorized to consider and act upon

questions of this kind. The dam with lock at Grand Cheniere was built some years ago by the Rice Growers' Association, which was practically composed of individuals or firms and expended funds subscribed for the purpose. Since that dam has been destroyed, the association has practically lapsed and can not be regarded as an active organization at this time.

7. It is believed that if the rice growers know that half cost of the dam must be subscribed by them they will cooperate to the extent indicated.

8. Blue print [1] showing general design of lock and dam upon which estimate is based is inclosed herewith.

Very respectfully,

LANSING H. BEACH,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[For report of the Board of Engineers for Rivers and Harbors on plan and estimate of cost of improvement, see p. 3.]

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[1] Not printed.

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ASHTABULA HARBOR, OHIO.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF ASHTABULA HARBOR, OHIO, WITH A VIEW TO WIDENING, DEEPENING, AND STRAIGHTENING THE CHANNEL OF ASHTABULA RIVER.

January 22, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 21, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 20th instant, together with copy of a report from Maj. Charles S. Bromwell, Corps of Engineers, dated September 30, 1912, with map, on preliminary examination of Ashtabula Harbor, Ohio, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 20, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Ashtabula Harbor, Ohio.

1. There is submitted herewith for transmission to Congress report dated September 30, 1912, by Maj. Chas. S. Bromwell, Corps of Engineers, with map, on preliminary examination of Ashtabula Harbor, Ohio, with a view to widening, deepening, and straightening

the channel of Ashtabula River, called for by the river and harbor act approved July 25, 1912.

2. The Ashtabula River was originally a small stream, but under operations conducted by local interests it was improved up to the present site of the shipyard of the Great Lakes Engineering Works, by widening, deepening, and straightening the channel and constructing a winding basin and certain bulkheads. As a result of these improvements it appears that the company mentioned above was induced to establish its plant at the locality, it being agreed by the city that the improvement should be continued so that the largest vessels would be able to reach and make use of the dry dock and shipyard.

3. The improvement now desired by local interests is the widening and deepening of the channel in the vicinity of the highway bridge. The district officer states that the only vessels going above the bridge are those desiring to reach the shipyard, and there are few vessels on the Great Lakes which can not reach the yard under present conditions. The greater part of the commerce of the port is carried on in the outer harbor, and the proposed improvement would not of itself cause any increase in the amount of freight handled at the harbor nor affect the cost of handling. The improvement would benefit the owners of the shipyard by enabling them to build and repair vessels over 600 feet in length, and general navigation would be benefited by the existence of these facilities. Inasmuch, however, as the shipyard was located at its present site under an agreement contemplating the improvement of the river at this point by the city of Ashtabula, which itself derives benefit from the presence of the shipyard, the district officer is of opinion that this improvement should be done at the expense of the city in accordance with its past promises, and that the Ashtabula River is not worthy of improvement by the General Government to the extent contemplated in the act. The division engineer concurs in this opinion.

4. This report has been referred as required by law to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated November 4, 1912, concurring in the opinion of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Ashtabula Harbor, Ohio, with a view to widening, deepening, and straightening the channel of Ashtabula River, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 4, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. A commodious outer harbor has been constructed by the General Government at this port at a cost somewhat in excess of $1,000,000. The improvement contemplated in the act is the widening, deepening, and straightening of the channel of Ashtabula River, which forms the inner harbor of Ashtabula and which has been improved by dredging and bulkheading by local interests. The river is crooked, and some difficulty is experienced by the largest class of vessels in passing the bridges and in making the bends. While the commerce of the port is large, amounting to about 7,000,000 tons, having a valuation of about $37,800,000, the greater part of it is handled in the outer harbor or near the outer end of the inner harbor, at a point beyond the first obstruction to navigation, which is the highway bridge.

2. Owing to the enlargement of the outer harbor in recent years, the commerce of the port is centering there and not developing on the stretch of river under consideration. The principal industry on the inner harbor is that of the Great Lakes Engineering Works, where lake vessels are constructed and repaired.

3. The district officer states that the only reason for the larger vessels going above the highway bridge is to reach the shipyard, that the delay in passing the bridge is of little relative importance, and that there are but few vessels on the Lakes which can not reach the yard under present conditions. He states that the improvement contemplated will not of itself cause any increase in the amount of freight handled at this harbor nor affect the cost of handling; that all of the transshipment of ore and coal will continue to be done more economically in the outer harbor than elsewhere; and, further, that the shipyard, which would be the principal interest benefited, was located at its present site through the agreement made with the company by the city of Ashtabula that it would improve and maintain the river to this point; and as the city receives material benefits by the presence of the shipyard, he is of opinion that the improvement should be made at the expense of the city, and that the Ashtabula River is not worthy of improvement by the General Government to the extent contemplated in the act. The division engineer is in accord with the views of the district officer.

4. Interested parties were advised of the unfavorable conclusions expressed in the district officer's report and invited to submit their views to the board. No communications on this subject, however, have been received.

5. From the facts presented, it appears that by far the greater part of the commerce of the port is carried on in the outer harbor, which has been improved at Government expense, and that the work now contemplated is desired mainly in the interests of the Great Lakes Engineering Works to render the yard and dock more accessible. The commerce of the port would not be increased or navigation affected except for the few vessels desiring to reach the

shipyard, and it appears that with some inconvenience this can be done under present conditions. In the opinion of the board, which accords with the views of the district officer and the division engineer, any work found advisable within the river should be done by local interests, and such work is not advisable at the expense of the Federal Government.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF ASHTABULA HARBOR, OHIO.

UNITED STATES ENGINEER OFFICE,
Cleveland, Ohio, September 30, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer, Lakes Division).
Subject: Preliminary examination Ashtabula Harbor, Ohio.

1. The river and harbor act approved July 25, 1912, contains the following provision:

> The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities: * * * Ashtabula Harbor, Ohio, with a view to widening, deepening, and straightening the channel of Ashtabula River.

This duty was assigned to this office by department letter dated August 3, 1912.

2. Ashtabula Harbor at the mouth of Ashtabula River is 55 miles east of Cleveland. When the work now authorized is completed an outer harbor trapezoidal in form containing about 100 acres will be formed suitably protected from the prevailing winds by breakwaters. The entrance to the outer harbor will be 600 feet wide and the channel will be 30 feet in depth.

3. The original project for the improvement of this harbor was adopted in 1826 and provided for the construction of two parallel piers extending into the lake. These jetties have been repaired from time to time and extended farther into the lake and the channel has been deepened by dredging to meet the increased demands of commerce.

In 1896 a project was adopted providing for the construction of two breakwaters each 1,500 feet long and 400 feet apart at their outer ends, the entrance being protected by pierheads. This plan was later modified to provide a west breakwater 1,800 feet long and an east breakwater 1,200 feet long. These breakwaters were completed under a continuous contract authorized in 1899. The river and harbor act of 1905 authorized the extension of the west breakwater shoreward and under this authorization it has been extended 1,580 feet.

4. In 1904 the Secretary of War under authority of law authorized the Pennsylvania Railroad to completely remove the west jetty and replace the same by a bulkhead 60 feet farther west.

In 1906 the Secretary of War authorized the Lake Shore & Michigan Southern Railroad to take possession of the east pier and to extend it and utilize it as a bulkhead. This company was also authorized to extend the east breakwater to protect its docks. Under this authority 1,100 feet of breakwater has been built by the company.

5. The present project, which is a modification of previous ones, provides for extending the west breakwater shoreward and also lakeward 1,700 feet, terminating in a pierhead. An east and west breakwater about 1,800 feet long is provided for leaving an entrance channel 600 feet wide between pierheads. From the eastern end of the breakwater a shore arm 2,700 feet long is provided for. About 600 feet of the outer end of the present east breakwater is to be removed. It provides for maintenance by dredging at an annual cost of $5,000. This maintenance is for a depth of 21 feet below mean lake level and by the authority of the Chief of Engineers is limited to the area between the old east breakwater, the old west breakwater, and the harbor line, as shown on the map.

6. Under this project the west breakwater has been extended shoreward 950 feet and lakeward 1,500 feet. The east breakwater has been built up to the water surface for a distance of 1,600 feet and the core deposited in the shore arm for a distance of 1,000 feet. All of the 600 feet of the old east breakwater will be removed this season.

7. The Ashtabula River was originally a small stream but has been deepened and widened from its mouth upstream to meet the demands of commerce. It is now 270 feet wide and about 21 feet deep for a distance of 2,800 feet from its mouth. From this point to the county highway bridge it is about 200 feet wide. From the highway bridge to the head of navigation the channel is from 100 to 180 feet in width. The lower two miles of the river with its connecting slips is utilized as an inner harbor. The entrance to the river is protected by parallel bulkheads protecting made land which is used as terminals by the Pennsylvania Railroad Co. and the Lake Shore Railroad Co. A depth of 21 feet between the entrance bulkheads is maintained by the railroad companies throughout the whole extent of their dock frontage. The depths in the upper portions of the river have been improved and maintained to a depth of 18 feet by the city of Ashtabula. The river is obstructed by two bridges, both of which are swing bridges, the minimum width of draw being at the Lake Shore and Michigan Southern Railroad bridge, where it is 100 feet.

8. The maximum variation of water level due to seasonal changes amounts to 3.9 feet and that due to winds does not exceed this amount. The depths herein stated refer to mean lake level, which is 0.4 foot above the present water surface.

9. The results of previous examinations at this locality were published in Annual Report of Chief of Engineers, 1895, pages 3122–3126; House Document No. 86, Fifty-ninth Congress, second session; House Document No. 654, Sixty-first Congress, second session.

10. The General Government has spent under the present project $1,049,072.29, all of which has been expended on the outer harbor.

11. Last year 4,263 vessels with an aggregate registered tonnage of 12,624,000, made use of this harbor, of which tonnage 54.5 per

cent was of vessels engaged in carrying iron ore; 40.6 per cent was of vessels engaged in carrying coal, and 4.9 per cent was of vessels engaged in carrying miscellaneous cargo. The receipts were 7,146,000 tons, of which 7,122,000 tons were iron ore. The shipments were 5,916,000 tons, of which 5,890,000 tons were coal. The estimated value of the freight received and shipped was $37,805,000. The receipts, shipments, and value of freight for the past four years were as follows:

Year.	Receipts.	Shipments.	Value.
1908	3,380,000	2,555,000	$18,855,000
1909	9,671,000	3,483,000	46,204,000
1910	10,771,000	5,487,000	54,519,000
1911	7,146,000	5,916,000	37,805,000

The bulk of the freight handled at this port is iron ore and coal. In former years all of the ore-unloading and coal-handling docks were located south of the county highway bridge. The necessity for more economic methods of handling this freight has caused the removal of these docks to the lake front, so that now only 30 per cent of the freight is handled in the river and practically all of this at its mouth. The docks above the bridge have been abandoned and the machinery removed.

12. In former years considerable delay was experienced by large vessels loaded with ore at the highway bridge, but now with the docks located in the outer harbor no large vessels with cargo regularly navigate the upper river except a car ferry which passes through the draw four times a day.

13. The docks above the highway bridge are all owned by the two railroad companies—the Lake Shore & Michigan Southern Railroad on the east side and the Pennsylvania Railroad on the west side—as far as the shipyard. Any improvement of the river will not cause these companies to reestablish their docks above the bridge, as any necessary increase in business can be taken care of in the outer harbor more economically. Nor is it probable that their docks would be sold or leased to competing companies. In fact, the companies are filling in their old slips above the highway bridge and dismantling their docks to increase the track facilities and storage yards used in connection with their terminals on the lake front. In the vicinity of the highway bridge there are a few small docks used by the fishing interests.

14. The Great Lakes Engineering Works is located on the west side of the river near the head of navigation. The company has invested over a million dollars in dry docks and equipment for building and repairing the largest vessels navigating the Lakes.

15. There is practically no other frontage on the navigable portion of the river which can be developed commercially. Above the shipyard the river is in its original state and is barely navigable for small boats. The site of the present shipyard was acquired by the city of Ashtabula and the channel leading to it was improved at a total cost of some $300,000. The improvement of the river consisted in widening, deepening, and straightening the upper part of it and in constructing a winding basin and building certain bulkheads. As a re-

sult of this liberal policy of the city the Great Lakes Engineering Works was persuaded to establish its plant at the locality, but it was further agreed on the part of the city that the improvement should be continued so that the largest vessels would be able to reach and make use of the dry dock and shipyard. The Chamber of Commerce acting for the city of Ashtabula in a contract made with the Great Lakes Engineering Works in October, 1909, states that all cuts, dredging and clearances, curves or bends from the breakwater in shall be ample to permit of steamers of full capacity of the dry docks being towed in and out from the breakwater to the dry docks. This has been construed to mean that the city guaranteed such further improvements as might be necessary. The city acquired, with a view to widening and straightening the river just above the bridge, a strip of land about 70 feet wide along the front of the ore dock and car ferry dock on the south side of the river. The secretary of the Chamber of Commerce in a letter to this office writes of this strip of land as follows:

> As this strip of land was secured as a precautionary measure in case it was desired to improve the channel at that point, and as it does not appear necessary at this time to cut this land away, no steps have been taken along this line to the writer's knowledge. But the land has been secured, having in mind the contract with the Great Lakes Engineering Works, so that in the event of the building of lake vessels of such size that it becomes necessary to cut off these dock ends, we have the land in our possession, enabling us to do so.

As a part of this further improvement efforts were made to cause the removal or reconstruction of the highway bridge, thereby permitting the river to be straightened and widened at that point.

16. Since 1896 the alteration of this bridge has been demanded by the navigation interests. On June 7, 1904, the War Department issued an order requiring the county commissioners to make certain alterations in the bridge. They expressed a willingness to do so, but were prevented by an injunction from a State court restraining the issuing of bonds to pay the cost of the work. The Department of Justice secured the indictment of the commissioners, but being convinced that their defense was a good one and that a conviction could not be obtained, the indictment was quashed and the order canceled September 17, 1907, and proceedings were instituted de novo with a view to issuing another order in the premises. A public hearing having been held and a final report thereon submitted, the War Department was about to issue a new order. This order was suspended for various reasons pending the consideration of a project for the further improvement of the harbor. Finally, in April, 1910, the district officer was instructed to take the matter under consideration and to hold a further hearing and to submit a report to the department. This report was submitted in August, 1911, and the essence of the report was as follows:

> * * * The bridge under existing conditions can not be termed an unreasonable obstruction to navigation, and neither its alteration nor entire removal would remedy the trouble. The difficulties attending navigation are due to the river itself rather than to the bridge, and the removal of these difficulties would require the widening of the channel and the reduction of its curvature, or its entire relocation, in addition to the alteration of the bridge. In fact, if the channel of the river were widened and straightened, the bridge in its present state would accommodate the largest vessels which now have occasion to pass it; but to provide for general Lake commerce, as desired by the complainants, would require both the improvement of the river and the removal of the bridge.

The War Department approved the report and stated—

> that in view of existing conditions as reported by the engineering authorities, the department does not feel justified in taking any action against the commissioners of Ashtabula County to compel the alteration or removal of the bridge at the expense of the county. The district engineer officer will be instructed to cooperate with the local, private, and municipal interests in the preparation of general plans for any work of channel improvement and bridge alteration which they may desire to undertake at their own expense, and to give them any assistance that may be practicable in bringing about appropriate adjustment and settlement of the trouble.

17. The available width of the draw is 107 feet, but the river makes a rather sharp bend at this point, so that navigation for the larger boats is rendered difficult. But the larger vessels do not have to go above this point to discharge or receive their cargoes. The only occasion for them to go above the bridge is for repairs or for lying up for the winter. In either case the time they are delayed at the bridge is of little relative importance. It is claimed that this shipyard was built to serve the class of large vessels that trade in Ashtabula and that any difficulty or delay in such service is to the detriment of general navigation. It is further claimed that even larger boats will be built for the Ashtabula service, and that these boats will be prevented from using this yard for emergency repairs in the season or for ordinary repairs in the winter. As these boats continue in service to the very close of the season of navigation, when their insurance terminates, it is claimed that it is a hardship to deprive them of access to a place where repairs can be made during the winter. If such a place is not provided for them here they will have to proceed to other shipyards at their own risk and without insurance or wait until the opening of navigation in the spring, when they can get insurance, and then have their repairs made elsewhere at the expense of a part of the working season.

18. These arguments are undoubtedly true, but the conditions are not so bad at present, as only a few vessels can not now reach the shipyard. Last year the *Wm. J. Filbert*, a vessel 607 feet long and 60 feet in beam passed through this bridge. There are on the Lakes at the present time only two vessels which can not pass through this bridge—the *Jas. M. Schoonmaker* and *Wm. P. Snyder*—each 617 feet in length and 64 feet in beam.

19. No public hearing was held in this investigation. A personal examination of the river was made and correspondence was carried on with the city officials of Ashtabula and with the Ashtabula Chamber of Commerce and other interested parties.

20. There are no wharves owned by the public at this harbor, nor is there public space available for the construction of such wharves. There is one dock, owned by the Lake Shore & Michigan Southern Railroad, on the east side of the river 500 feet above the highway bridge, which offers terminal facilities, including rail connection, to all on equal terms. All other terminals are owned by the railroads and are open to the public for the shipment of iron ore and coal, which are the only commodities handled at these terminals. All of these terminals are provided with mechanical appliances for handling their special commodity. There are no appliances at the dock which is open to the public. Since these two railroad companies own practically all the frontage in the harbor and on the river, they will always have a monopoly in the transfer of iron ore and coal. A public dock

should be provided where package freight and passengers could be accommodated.

21. There are no questions involving the development and utilization of water power conditions at this locality nor other subjects connected with the interests of navigation.

22. In conclusion, it appears that the only improvement desired is the widening and straightening of the channel in the vicinity of the highway bridge. Such improvement of itself will not increase the amount of freight handled at this harbor nor affect the cost of handling. All of the transshipment of iron ore and coal will continue to be done more economically in the outer harbor than elsewhere. There is no assurance of the establishment of other business which will require the services of the larger class of boats above the highway bridge. This improvement would be of benefit to the Great Lakes Engineering Works, since it would permit them to build and repair vessels over 600 feet in length. The general navigation interests would be benefited by having another shipyard available for the repair of vessels at all seasons of the year. Inasmuch, however, as this shipyard was located here by the inducements held out to the company by the city of Ashtabula, one of which inducements was the improvement of the river at this point, and inasmuch as the city benefits greatly by the presence of the shipyard with its large number of employees, I am of the opinion that this improvement should be done at the expense of the city and that the Ashtabula River is not worthy of improvement by the General Government to the extent contemplated in the act.

CHAS. S. BROMWELL,
Major, Corps of Engineers.

[First indorsement.]

OFFICE DIVISION ENGINEER, LAKES DIVISION,
Buffalo, N. Y., October 12, 1912.

To the CHIEF OF ENGINEERS:

I concur in the opinion of the district officer that Astabula Harbor, Ohio, is not worthy of improvement by the General Government to the extent contemplated by the act.

J. G. WARREN,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see page 3.]

O

SHREWSBURY RIVER, N. J.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION OF SHREWSBURY RIVER, N. J., INCLUDING THE NORTH AND SOUTH BRANCHES, WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT.

January 23, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 21, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 20th instant, together with copies of reports from Col. William T. Rossell, Corps of Engineers, dated November 8 and December 30, 1912, with map, on preliminary examination and estimate of cost of improvement, respectively, of Shrewsbury River, N. J., including the north and south branches, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 20, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and plan and estimate of cost of improvement of Shrewsbury River, N. J.

1. There are submitted herewith, for transmission to Congress, reports dated November 8 and December 30, 1912, with map, by Col.

Wm. T. Rossell, Corps of Engineers, on preliminary examination an estimate of cost of improvement, respectively, of Shrewsbury River N. J., including the north and south branches, called for by the rive and harbor act approved July 25, 1912.

2. The approved project for improvement of this river was adopted in 1879, and with subsequent modifications, provides for forming, by means of dredging and diking, a channel 6 feet in depth at mean low water, with width of 300 feet in the main stem, and widths from 150 to 200 feet in the North Branch to Oceanic and in the South Branch to Seabright, at an estimated cost of $234,062, and $10,000 annually for maintenance. The improvement now desired is reported by the district officer to be the maintenance of the channels covered by the existing project to a depth of 8 feet at mean low water and the extension of the same to Red Bank on the North Branch and to Branchport on the South Branch; also the improvement of the channel at the bend below Seabright.

3. The extension of the improved channel to Red Bank and Branchport was recommended by this department in 1903 as a result of an examination ordered by the river and harbor act approved June 13, 1902, but no action thereon has been taken by Congress. The plan now proposed by the district officer provides for a width of 300 feet from the mouth to Island Beach, thence 200 feet to the junction of the two branches, and thence 150 feet to Red Bank and Branchport. The estimate for a depth of 6 feet is $294,455.75 and for a depth of 8 feet $675,135.85. The district officer expresses the opinion that Shrewsbury River is worthy of improvement by the General Government to the extent of providing a navigable channel 8 feet in depth up to the points named.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith, dated January 14, 1913, in which the opinion is expressed that the needs of commerce and navigation and the probable resulting benefits are sufficient to justify the United States in undertaking the further improvement of this river in accordance with the 6-foot project outlined above, at a total estimated cost of approximately $295,000.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Shrewsbury River, N. J., up to Red Bank on the North Branch and to Branchport on the South Branch, is deemed advisable so far as to secure an available channel depth of 6 feet and channel widths as specified above, increased at entrances and on curves, following in general the methods described in the report of the district officer at an estimated cost of $295,000 for first construction and $10,000 annually for maintenance during construction, and $20,000 annually thereafter, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $100,000 and subsequent appropriations of about $100,000 per year for two years.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON PLAN AND ESTIMATE OF COST OF IMPROVEMENT.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Shrewsbury River is composed of a main stem and two branches, he North Branch and the South Branch. North Branch is navigable o Red Bank, 8 miles from the mouth of the river, and South Branch o Branchport, 9 miles from the mouth. The mean range of tide is .6 feet at junction of North and South Branches, 2.48 feet at Red Bank, and about 1 foot at Seabright, South Branch.

2. The existing project provides for a channel, to be secured by dredging and diking, 6 feet deep at mean low water and 300 feet wide n the main stem, and the same depth and widths of 150 feet to 200 feet n the North Branch to Oceanic, 5 miles from the mouth, and in the South Branch to Seabright, 5½ miles from the mouth. This project was practically completed in 1905. The amount expended to June 30, 1912, was approximately $382,600.

3. The improvement now desired is a depth of 8 feet at mean low water over the existing project and an extension of that depth to Red Bank on the North Branch and to Branchport on the South Branch; and also an adjustment of the channel a short distance south of Seabright. The amount of commerce for the fiscal year 1911-1912 is reported as in excess of 1,300,000 tons of a general and miscellaneous character, but considering the size of boats and the number of trips, this seems excessive.

4. As the result of favorable action of the report on preliminary examination, the district officer, who is also division engineer, submits estimates for channels 6 feet and 8 feet in depth, mean low water, allowing 2 feet overdepth in each case as necessary to give the desired depth at all times, as follows:

Locality.	Width.	6 feet.	8 feet.
	Feet.		
Mouth of river to Island Beach	300	$35,853.30	$82,756.80
Island Beach to junction	200	3,257.10	24,350.10
Junction to Oceanic, North Branch	150	9,601.80	46,910.70
North Branch above Oceanic	150	25,981.55	73,918.60
Junction to Seabright, South Branch	150	26,489.40	64,482.60
Above Seabright, South Branch	150	162,272.60	310,717.05
Total		263,455.75	603,135.85
Contingencies, etc		31,000.00	72,000.00
Grand total		294,455.75	675,135.85

Annual maintenance, $20,000 in either case.

5. The district officer recommends the improvement in accordance with the larger estimate. He states that it will be necessary to maintain the channels as the work progresses, and for this purpose $10,000 per annum will be required until the completion of the project, after which the full amount of $20,000 will be necessary.

6. There is a large and growing commerce on this waterway, and the passenger service is becoming very important. It is believed that the needs of commerce and navigation and the probable resulting

benefits are sufficient to justify the smaller improvement proposed by the district officer, and therefore the board reports that in its opinion it is advisable for the United States to undertake the work in accordance with the 6-foot project outlined above, at a total estimated cost of approximately $295,000 and $10,000 annually for maintenance during construction, and $20,000 annually after completion of the project. The board recommends an initial appropriation of $100,000, and appropriations of $100,000 until completed.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

W. C. Langfitt,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF SHREWSBURY RIVER, N. J.

United States Engineer Office,
New York City, November 8, 1912.

From: Col. Wm. T. Rossell, Corps of Engineers.
To: The Chief of Engineers.
Subject: Preliminary examination report on Shrewsbury River, N. J.

1. Report upon a preliminary examination of Shrewsbury River, N. J., including the North and South Branches, made in compliance with department letter dated August 3, 1912, and pursuant to the river and harbor act approved July 25, 1912.

2. This river is a large tidal basin in the eastern part of New Jersey, and consists of two bays, each having an area of about 3 square miles, and known, respectively, as the North Branch (or Navesink River) and the South Branch, and a channel called the Main Stem, which unites the two branches at their eastern ends and extends northwardly to the outlet at southeast end of Sandy Hook Bay. The river is navigable on the North Branch to Red Bank, 8 miles from the mouth, where it is crossed by three bridges without draws, and on the South Branch to Branchport, 9 miles from the mouth; also to Little Silver, Oceanport, Parkers Creek, North Long Branch, and Monmouth Beach, on the several arms of the South Branch. Mean range of tides 4.6 feet at mouth of river, 2.6 feet at junction of North and South Branches, 2.48 feet at Red Bank, and about 1 foot at and below Seabright, South Branch.

3. The part of the river which has been under improvement by the United States consists of the Main Stem, the North Branch to Oceanic, 5 miles from the mouth, and the South Branch to the vicinity of Seabright, about 5½ miles from the mouth. The bays above Oceanic and Seabright had sufficient water to accommodate navigation. There are eight drawbridges crossing the river, one at Highlands, Main Stem, railroad and highway bridge; one at Oceanic, North Branch, highway bridge; one at Seabright, highway bridge; two at Little Silver and Oceanport, highway and railroad bridges; two at Pleasure Bay and North Long Branch, highway bridges; and one at Mana-

hassett Bay, highway bridge. These bridges have draw openings of ample size for present needs of navigation.

4. Before any improvement was begun by the United States the available depth to Oceanic, on the North Branch, was 3½ feet, and to Seabright, on the South Branch, it was 2½ feet; and the depth in the Main Stem was 4 feet.

5. Existing project for improvement adopted March 3, 1879, with subsequent modifications, provides for forming a channel by means of dredging and diking, 6 feet in depth at mean low water, with width of 300 feet in the Main Stem, and widths from 150 to 200 feet in the North Branch to Oceanic, and in the South Branch to Seabright, at a modified estimated cost of $234,062. The approved estimate for annual maintenance is $10,000. A detailed description of the projects for this improvement is printed in the Annual Report of the Chief of Engineers for 1910, part 1, page 209. This project was practically completed in 1905 under appropriation of 1902, and subsequent appropriations have been expended in maintaining the 6-foot channels by dredging. Maintenance dredging is now in progress.

6. A preliminary examination and survey of the river was ordered by the river and harbor act of June 13, 1902, "with a view to obtaining an 8-foot channel from its mouth to Red Bank on the North Branch and to Branchport on the South Branch." Reports upon this preliminary examination and survey are printed in House Document No. 123, Fifty-eighth Congress, second session, and in the Annual Report of the Chief of Engineers for 1904, page 1162. This report contains a map and estimates of the costs of channels 6 and 8 feet in depth at mean low water, and this survey was favorably reported on by the department, but no action by Congress has been taken upon the proposed addition to the improvement. A copy of the index map accompanying that report is transmitted herewith, the channel lines recommended having been placed on the map. Detail maps in six sheets (tracings) are on file in the office of the Chief of Engineers. Copy of a topographical map [1] of the geological survey of New Jersey, showing this vicinity, is also transmitted.

7. The additional improvement now desired is the maintenance of the channels covered by the existing project to 8 feet depth at mean low water, and the extension of same to Red Bank on the North Branch and to Branchport on the South Branch; also the improvement of the channel at the bend below Seabright. It was suggested by the Hon. Thomas G. Patten, M. C., and president of the New York & Long Branch Steamboat Co., that this improvement might be accomplished by cutting a channel through Pollys Gut to the northward of the present channel, or that the channel might be cut through to the southward of the present channel. These layouts are shown by broken lines on the map herewith. It appears, however, from a study of the matter that the difficulty of rounding the sharp bend at Seabright might more easily be remedied by dredging out the shoal point on the north side of the channel, as shown by the full red line.

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[1] Not printed.

8. The commercial statistics of Shrewsbury River are as follows:

Commercial statistics, fiscal year 1911–12.

VESSEL CLASSIFICATION.

Class.	American.		Net registered tonnage.	Draft when loaded.	Passengers.
	Number of boats.	Number of trips.			
Registered:				*Feet.*	
Steam	6	1,955	253–685	4½–5½	405,558
Sailing	16	425	25– 90	3½–6	....
Barges	2	8	75	6	....
Motor boats	1,000	1,500	4	....	....
Unregistered: Motor boats	3,200	5,400	2– 4	2½–3½	....
Total	4,224	9,288	2–685	2½–6	405,558

FREIGHT TRAFFIC.

Articles.	Amount in customary units.		Amount in short tons.	Valuation.
	Quantity.	Unit.		
Coal	25,892	Long tons	29,000	$126,000
Brick	7,100,000	Brick	2,497	16,400
Fish	9,004	Short tons	9,004	1,800,300
Lumber	15,100	M feet b. m.	10,150	403,500
Stone and sand	8,214	Long tons	9,200	24,600
General merchandise	620,000	Short tons	620,000	800,000
Miscellaneous	500,005	.....do	500,005	501,050
Cement and plaster	882	Long tons	1,000	14,000
Grain	2,857	Bushels	100	2,500
Fertilizer	100	Short tons	100	2,000
Farm produce	125,000	.....do	125,000	3,125,000
Oils	36,000	Gallons	132	5,400
Total	....	....	1,306,188	6,820,750

The commerce of the river is increasing, and was reported in 1910 as 1,608,600 tons, with a valuation of $6,548,000, and in 1911–12 as 1,306,188 tons, with a valuation of $6,820,750, and the number of passengers carried 405,558, as against 400,000 tons and 327,216 passengers carried, as reported by Maj. W. L. Marshall in connection with the survey of 1903.

9. Data regarding commercial conditions of Shrewsbury River furnished by parties engaged in commerce along the river.

Name of party.	1		2		3	4	5
	(a) Is depth of water sufficient for present demands of commerce.	(b) If not, what depth is required.	(a) What depth would be sufficient for prospective demands of commerce.	(b) Give reason for answer.	What changes or increase of commerce would result from increase of channel dimensions.	Would an increase of channel depths probably have any effect to reduce freight rates.	Have you any plans for increase of receipts or shipments by water.
		Feet.	*Feet.*				
Chas. P. Irwin.	No.	10	15	Large boats have tried but could not come up, so have gone elsewhere.	1,000 per cent.	It certainly would.	I would enlarge my plant double my present capacity. I would also favor a large anchorage basin out opposite Terminals—Red Bank.
Fred Rumpf, jr.	No.	10	12	Boats could come to my basin which can not get there now.	100 per cent increase.	Yes, decidedly.	Would enlarge my plant. Would like to see a large anchorage basin with same depth as channel out opposite town of Red Bank.
George W. Elliot	No....	8	10	Give chance for barges, etc.	400 per cent.	Yes; 40 per cent.	Yes; would enlarge plant.
J. D. Throckmorton.	No....	9	12	Larger boats required.	Commerce would increase 100 per cent.	Yes.......	Would build faster boat.
Merchants Steamboat Co., Capt. C. E. Throckmorton.	No....	8	10	Increase of traffic and building up along line of river.	100 per cent increase.	Yes.......	Yes; a large area for anchorage opposite Red Bank.
New York & Long Branch Steamboat Co. (Patten Line), Wm. C. Hayden.	No....	8	12	Would get larger boats to handle business better.	100 per cent.	Yes.......	Yes; larger boats.
E. H. Wilbur, president dock commission, Fairhaven, N. J.	No....	8	10	....	100 per cent increase.	Yes.......	No.
R. J. Rogers, chairman of docks of borough of Oceanic, N. J.	No....	8	10	....	100 per cent.	Yes.......	No.

10. Water terminals and transfer facilities:

MAIN STEM.

(*a*) The following docks and water terminals are located on this section of the Shrewsbury River. At Highlands, N. J., two docks centrally located and generally efficient. These docks are owned, respectively, by John M. Ryker and the New York & Long Branch Steamboat Co. The facilities of these docks are open to public use on equal terms to all. There are no mechanical devices for handling freight.

(*b*) The docks have no direct railroad connection.

(*c*) The docks are approached by adequate highways.

(*d*) There is no necessity for more docks in this vicinity.

NORTH BRANCH.

(*a*) One at Locust Point, located at the foot of a public highway, in the township of Middletown; this dock is owned by an individual, open to all on equal terms. One at Fairhaven owned by the borough, located at the foot of the principal street; this dock is open for public use at equal terms to all. At Oceanic, located at the foot of the principal street of the borough and owned by the borough of Rumson; it is open for public use on equal terms to all; Borden's private dock for landing yachts, owned by M. C. D. Borden estate. At Red Bank, N. J.: The steamboat dock owned by the Merchants' Steamboat Co., lying at the foot of Wharf Avenue; Rumpf's dock, a private dock and basin used in yacht building lying at the foot of Private Street. Irwin's dock, a private dock used for yacht stowing and yacht building, 200 feet east of the foot of Wharf Avenue. There are mechanical devices on Irwin's dock for handling freight. These docks are open to all free, but they are not in the true sense of the word "public docks."

(*b*) There is no physical connection between the docks at Locust Point, Fairhaven, and Oceanic, with railroads, the nearest railroad being 4, 2, and 3 miles, respectively, distant. The steamboat wharf at Red Bank has a trolley connecting with it; otherwise there are no direct railroad connections with the docks in Red Bank.

(*c*) Adequate highways have been constructed to each of these terminals.

(*d*) There is no need for further docks at Locust Point and at Fairhaven. The dock at Oceanic should be enlarged, there being ample space for such improvement. There is a necessity for a public dock at Red Bank. A public dock is now being provided for by the municipality, which has taken title to property at the foot of Maple Avenue, on Washington Street.

SOUTH BRANCH.

(*a*) There are three wharves centrally located at Seabright, two owned by individuals and one by the New York & Long Branch Steamboat Co. These docks are not public docks, but are open to the public on equal terms. In addition, there are one or two pieces of property that are bulkheaded and could be used for boat landings, but are not open to the public. Simple unloading devices are located on these wharves. The New York & Long Branch Steamboat Co. have a dock at Pleasure Bay and at Rockwell Avenue, Long Branch. These wharves are not open to all on equal terms.

(*b*) The docks at Seabright have no direct railroad connections, but there are indirect railroad connections with water carriers. The docks at Pleasure Bay and Long Branch have trolley connections, but no railroad connections.

(*c*) Improved and adequate highways lead to all of these docks.

(*d*) There is no necessity for further water terminals at Seabright. There seems to be a necessity for a public wharf at Pleasure Bay and at Rockwell Avenue, Long Branch, as they are in a rapidly growing section.

11. The improvement proposed, dredging for extension and deepening of the channels, would have no connection with the subject of water power, and but little with flood or land reclamation. The dredged material would probably be used for filling private marsh lands, but that disposal would not change estimated costs of the work, which are based upon that method of disposal rather than towing it to sea, which is impracticable with the small plant which can be used upon that work.

12. The present depths in the river are practically as shown on the map of survey of 1903, but some shoaling is reported in the South Branch below Seabright. The desired improvement may be made by dredging channels to 8 feet in depth, in accordance with the estimates which accompanied the report on that survey. On account of the shifting nature of the sand to be dredged, it will be necessary to dredge 8 feet in order to secure 6 feet for navigation for sometime after the dredging is done. This has to be done at the present time in maintenance work on the part of the river now under improvement. This feature is also referred to in the report of Maj. W. L. Marshall dated October 7, 1903, upon the survey referred to.

13. In my opinion the Shrewsbury River is worthy of improvement by the General Government to the extent of providing a navigable channel of 8 feet in depth at mean low water to Red Bank and Branchport, in accordance with the estimates contained in the report upon the survey of 1903. No further surveys are necessary.

WM. T. ROSSELL.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 26, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

For reasons stated herein the board concurs with the district officer in the opinion that further improvement is desirable at this locality, and it recommends that estimates be authorized for channels of 6 and 8 feet in depth, with a view to determining the extent of the improvement that should be undertaken.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF SHREWSBURY RIVER, N. J.

UNITED STATES ENGINEER OFFICE,
New York City, December 30, 1912.

From. Col. Wm. T. Rossell, Corps of Engineers.
To: The Chief of Engineers.
Subject: Plan and estimate of cost of improvement of Shrewsbury River, N. J.

1. The following report with plan and estimate for the improvement of Shrewsbury River, N. J., including the north and south branches, is submitted in compliance with department letter dated December 4, 1912.

2. The estimates provide for channels of the minimum widths stated therein, and which at mean low water will have minimum depths of 6 and 8 feet, such width and depths being considered suitable for boats of maximum draft of 6 and 8 feet, respectively, for which the channel is desired. These channels are all outlined on the copy of index map of the survey of 1903, submitted with report on the preliminary examination dated November 8, 1912.

3. It will be noted by reference to the report upon the preliminary examination that eight parties giving opinions upon the question of depth for this improvement said that the present depths were not sufficient, that the required depths should be from 8 to 10 feet for present commerce, and from 10 to 15 feet for prospective commerce.

4. The basins above Oceanic on the north branch and Seabright on the south branch have shoaled considerably since the survey of 1903, and this shoaling interferes very seriously with the carrying out of a regular service for passenger traffic by steamboat lines. The tonnage of this river has doubled since the survey of 1903, and the increased depth proposed is necessary for the present commerce.

5. After a careful study of the situation I am of the opinion that a depth of 8 feet at average low water should be provided. This will require dredging to 10 feet in accordance with the following estimate. To continue the depth provided by the present project throughout the north and south branches, including the extensions proposed, will require dredging to 8 feet, also in accordance with the estimate.

Estimates.

[Channels of 6+2 and 8+2 feet depth.]

Locality.	Length.	Width.	Cubic yards (scow measurement).		Cost per cubic yard.	Cost.	
			Depth, 6+2.	Depth, 8+2.		Depth, 6+2.	Depth, 8+2.
Mouth of River to Island Beach.	7,325	300	119,511	275,856	$0.30	$35,853.30	$82,756.80
Island Beach to Junction.......	5,500	200	10.857	81,167	.30	3,257.10	24,350.10
Junction to Oceanic—north branch....................	11,605	150	32,006	156,369	.30	9,601.80	46,910.70
Above Oceanic—north branch..	14,455	150	74,233	211,196	.35	25,981.55	73,918.60
Junction to Seabright—south branch....................	8,555	150	88,298	214,942	.30	26,489.40	64,482.60
Above Seabright—south branch	25,280	150	463,636	887,763	.35	62.272.60	310,717.05
Total....................	....	....	....	....	....	263,455.75	603,135.85
Contingencies, supervision, etc., about 12 per cent............	....	....	....	....	....	31,000.00	72,000.00
Total....................	....	....	....	....	....	294,455.75	675,135.85
Annual maintenance is estimated at....................	....	....	....	....	....	20,000.00	20,000.00

Estimates of quantities not included in 1903 estimate consist of removal of shoal point at Seabright, and 1 foot more overdepth.

The above estimates are based on scow measurement, 20 per cent increase over prism measurement; side slopes of 1 on 3, and overdepths of 2 feet as mentioned above. The material to be removed is principally mud and sand.

6. The initial appropriation should be $150,000, and $100,000 should be provided annually until the channels are completed, and the rate of work should be as great as the appropriations will admit of.

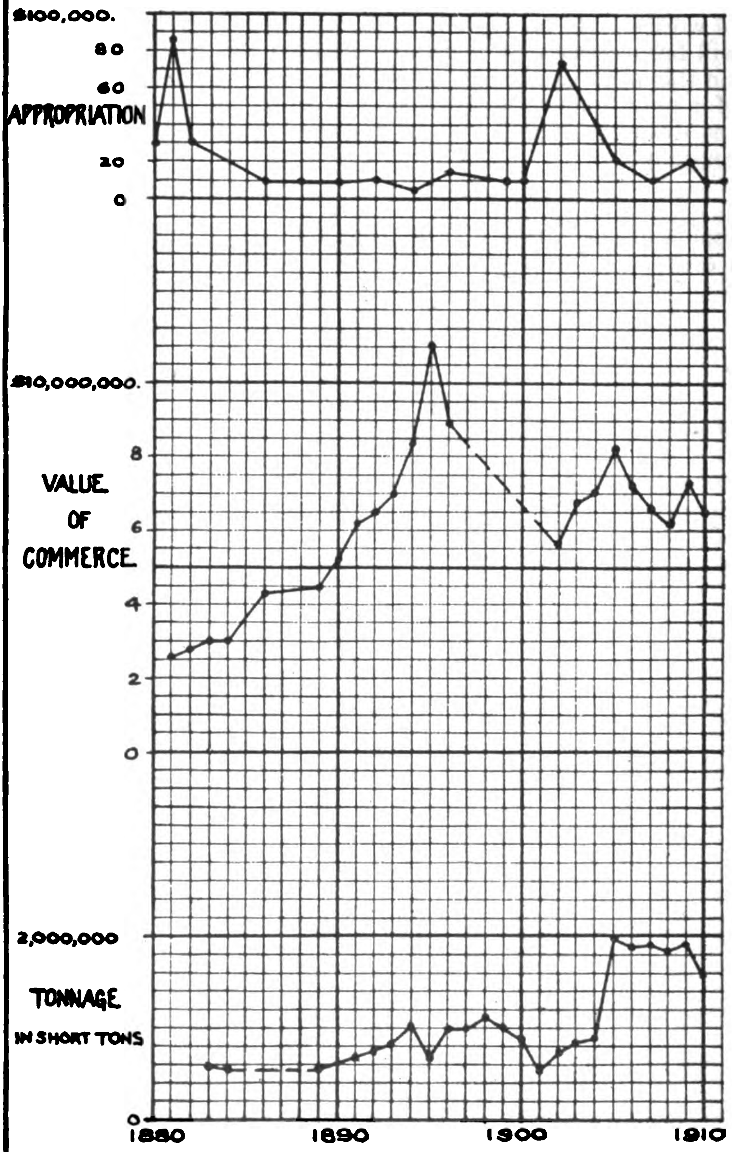
7. It will be necessary to maintain the channels as the work progresses and this work can be accomplished under the present approved estimate for maintenance of $10,000, and when the channels are all dredged as desired $20,000 will be required annually to maintain them throughout.

Wm. T. Rossell.

[For Report of the Board of Engineers for Rivers and Harbors on plan and estimate of cost of improvement, see page 3.]

SHREWSBURY RIVER, N.J.

Diagram showing, annualy, total freight carried, valuation of same, and appropriation, to June 30, 1912.



62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1297.

HORSE SHOE LAKE, MISS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF HORSE SHOE LAKE, WHICH LEAVES TCHULA LAKE IN HOLMES COUNTY, MISS.

JANUARY 22, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 21, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 20th instant, together with copy of a report from Maj. J. A. Woodruff, Corps of Engineers, dated November 23, 1912, on preliminary examination of Horse Shoe Lake, Miss., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 20, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Horse Shoe Lake, Miss.

1. There is submitted herewith, for transmission to Congress, report dated November 23, 1912, by Maj. J. A. Woodruff, Corps of Engineers, on preliminary examination of Horse Shoe Lake, which leaves Tchula Lake in Holmes County, Miss., called for by the river and harbor act approved July 25, 1912.

2. No previous examination of this lake has been made by this Department, and no work of improvement has been done by the United States in the interests of navigation. The lake was formerly connected at both ends with Tchula Lake, but at one end it is now entirely filled up and disconnected, and is navigable only during a 15-foot stage of high water. The district officer reports that there is no navigation and none is practicable without improvement to an extent not justified by the benefits to be expected. He therefore expresses the opinion that Horse Shoe Lake is not worthy of improvement by the General Government. The division engineer concurs in this opinion.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of December 23, 1912, concurring with the views of the district officer and division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress, I report that the improvement by the United States of Horse Shoe Lake, which leaves Tchula Lake in Holmes County, Miss., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 23, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Horse Shoe Lake, formerly connected at both ends with Tchula Lake, is entirely filled up and disconnected at one end, and also at the other end when the water of Tchula Lake is below a 15-foot stage. The bed of the lake is covered with a growth of timber and brushwood. No boats have been in the lake for years, and none can get in.

2. The district officer expresses the opinion, in which the division engineer concurs, that Horse Shoe Lake is not worthy of improvement by the General Government.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on this subject have been received.

4. From the description given by the district officer it appears that this is not a navigable waterway; that there is little or no commerce to be affected by improvement; and if improved, the cost would be out of reasonable proportion to the benefits. The board therefore concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the General Government to undertake the improvement of Horse Shoe Lake, Miss.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF HORSE SHOE LAKE, MISS.

United States Engineer Office,
Vicksburg, Miss., November 23, 1912.

From: Maj. J. A. Woodruff, Corps of Engineers.
To: The Chief of Engineers, U. S. Army.
(Through the Division Engineer).
Subject: Preliminary examination of Horse Shoe Lake, Miss.

1. The following report is submitted on a preliminary examination of Horse Shoe Lake, which leaves Tchula Lake in Holmes County, Miss., required by section 2 of the river and harbor act of July 25, 1912, and assigned to me by letter from the Office of the Chief of Engineers, dated August 3, 1912.

2. No previous reports of examinations of this lake are on record, and no work has been done by the United States to improve the navigation.

3. The preliminary examination was made by me on August 16, 1912, accompanied by Assistant Engineer H. M. Marshall.

4. Horse Shoe Lake leaves Tchula Lake about 3 miles from the town of Tchula, which is on the east bank of Tchula Lake and on a branch of the Yazoo & Mississippi Valley Railroad running from Jackson to Greenwood, Miss. The lake, where it leaves Tchula Lake, is nearly filled up with silt, so that the latter must be 15 feet above low water before the water backs up into Horse Shoe Lake. It usually is backed up about four months in a year (from February to May). The bed of Horse Shoe Lake is grown up in timber and undergrowth. In its usual condition it is dry except in a few places where it is open pond for about 300 feet in length and about 50 or 75 feet in width.

5. No boats have been in Horse Shoe Lake for years and none can get into it. It must have been separated from Tchula Lake many years and is no longer a navigable stream. The banks are 450 to 500 feet apart and 25 or 30 feet high, and the bed is simply a forest. There is a wooden trestle highway bridge across it at the lower end.

6. There are plantations along the 11 or 12 miles of its length and considerable cotton and corn is produced, but it is not over 5 or 6 miles haul to Tchula Lake or the railroad and no commerce would develop by reason of its improvement.

7. There is no navigation in Horse Shoe Lake. There are no terminal facilities and none are required. No water power can be developed and there are no other subjects that may be properly connected with the improvement for navigation. I am therefore

of the opinion that Horse Shoe Lake is not worthy of improvement by the General Government.

8. There are submitted herewith a map and two photographs[1] of the lake.

J. A. WOODRUFF.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., November 26, 1912.

To Chief of Engineers, concurring in the opinion of the district officer, as stated in paragraph 7, that Horse Shoe Lake, Miss., is not worthy of improvement by the General Government at this time.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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[1] Not printed.

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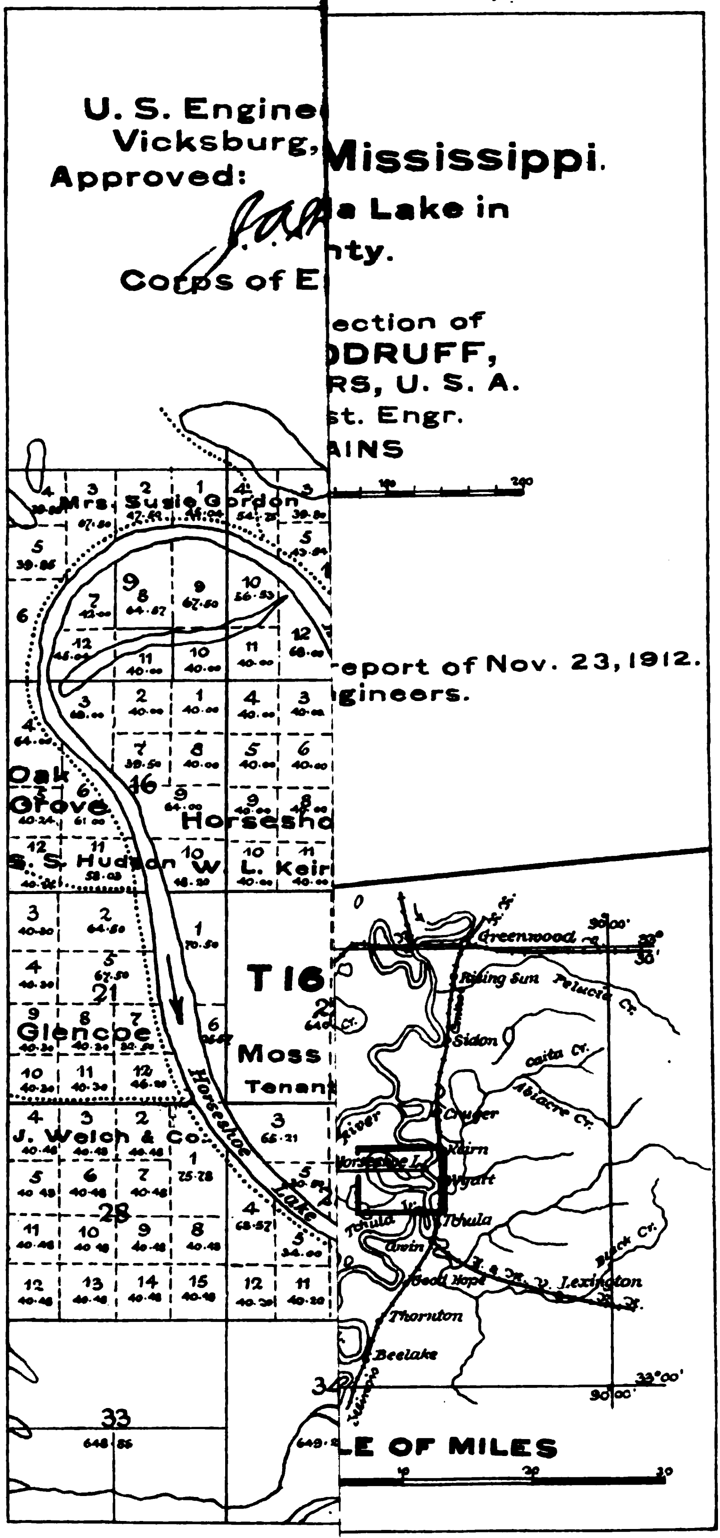
WAR DEPARTMEN GINEERS, U. S. ARMY



.1297 ; 62d Cong., 3d Sess.

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1309.

SAN DIEGO HARBOR, CAL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION AND SURVEY OF SAN DIEGO HARBOR, CAL.

JANUARY 28, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 27, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copies of reports from Lieut. Col. C. H. McKinstry, Corps of Engineers, dated November 25, 1912, and January 9, 1913, with map, on preliminary examination and survey, respectively, of San Diego Harbor, Cal., including both the inner harbor and the bar entrance, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF ENGINEERS,
Washington, January 27, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of San Diego Harbor, Cal.

1. There are submitted herewith for transmission to Congress reports dated November 25, 1912, and January 9, 1913, with map, by Lieut. Col. C. H. McKinstry, Corps of Engineers, on preliminary

examination and survey, respectively, of San Diego Harbor, Cal., including both the inner harbor and the bar entrance, called for by the river and harbor act approved July 25, 1912.

2. This harbor has been improved by the United States by the construction of a dike and a jetty, and by dredging on the bar and middle ground. The existing project, adopted by the river and harbor act approved June 25, 1910, provides for dredging a channel through the outer bar 30 feet deep and 600 feet wide, and a channel through the middle ground 30 feet deep and 400 feet wide at its southerly end, widening out at the northerly end. The district officer states that the present channels are of such capacity that at low water, in ordinary weather, vessels drawing 28 feet can safely enter and depart, but in rough weather it would not be safe for a vessel drawing over 25 feet to attempt to use the bar channel at low water. While present depths are ample for most of the vessels visiting the port, the ships of the American-Hawaiian line draw as much as 27 feet, and it is stated that the new ships of this line will draw 29 or 30 feet. These ships will require for the safe navigation of the entrance at all stages and in all weathers a depth as much as 35 feet at mean lower low water.

3. The Navy has a coaling wharf at this harbor and uses the port as a base for part of its drills. In view of its interest in the harbor correspondence was had with that department respecting the present needs of the Navy, and the district officer submits estimates therefor as well as for the improvement deemed requisite in the interests of general commerce and navigation. The improvement suggested by the Navy is a depth of 40 feet in the bar channel and a depth of 35 feet through the midde ground, including the removal of a shoal opposite the coaling wharf, and the cost of this improvement is estimated at $1,063,696 and $47,533 annually for maintenance. A modification of this plan omitting some of the removal of this shoal is estimated to cost $388,637, and $22,067 annually for maintenance. The district officer states that the modified plan will afford a safe entrance to capital ships of the Navy and is inferior to the Navy plan only in affording a less convenient approach to the Navy coal wharf.

4. The improvement desired by local interests is the opening of the harbor to vessels drawing 35 feet. While vessels drawing more than 30 feet will undoubtedly be used on routes passing close to San Diego Harbor upon completion of the Panama Canal, the district officer does not believe that, for the immediate future at least, the volume of such commerce would justify the large cost of the desired improvement, or that the freight rate to San Diego by vessels of the largest size would be materially less than by vessels drawing, say, 30 feet. Recognizing, however, that some increase of facilities is required to meet the present and prospective needs of commerce, he recommends the deepening of the bar channel to 35 feet and the middle ground to 32 feet, which coincides with the improvement formerly suggested by the Navy Department, at an estimated cost of $208,786, and $19,289 annually for maintenance. He submits no recommendation regarding the work now desired by the Navy, but the division engineer states that the requirements of that department should be fully met by the adoption of the plan recommended by it.

5. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 21, 1913, concurring with the views of the district officer.

6. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of San Diego Harbor, Cal., including both the inner harbor and the bar entrance is deemed advisable in the interest of general navigation so far as to secure an available harbor or channel depth of 35 feet and a channel width of 570 feet on bottom through the outer bar, and a depth of 32 feet over the area of the middle ground indicated on the accompanying map, following in general the methods described in the reports of the district officer, at an estimated cost of $208,786 for first construction and $19,289 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

7. It is believed that the above improvements will provide all that is at present needed by general navigation, and the correspondence with the Navy Department and the estimates based thereon are transmitted herewith for the information of Congress in case it desires to extend the improvement further in the interest of that department.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 21, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. San Diego Harbor, Cal., has been improved by the United States by the construction of a dike and jetty and by dredging on the bar and middle ground. The existing project, adopted by the act of June 25, 1910, provides for dredging a channel through the outer bar 30 feet deep and 600 feet wide, and a channel through the middle ground 30 feet deep and 400 feet wide at its southerly end, widening out at the northerly end. Expenditures on all projects to June 30, 1912, amounted to $809,819.57.

2. The act ordering the present investigation does not specify the extent of the further improvement contemplated. Local interests desire that the United States open the harbor to ships drawing 35 feet. The district officer states that the San Diego bar is generally smooth and the middle ground channel always so. The present channels are of such capacity that at low water, in ordinary weather, vessels drawing 28 feet can safely enter and depart, but in rough weather it would not be safe for a vessel drawing over 25 feet to attempt to use the bar channel at low water. Present depths are more than ample for most of the vessels that trade between San Diego and points in California, Oregon, and Washington, but the ships of the American-Hawaiian

Line, which touch at this port, draw as much as 27 feet, and it is stated that new ships of this line will draw 29 or 30 feet. These ships will require for the safe navigation of the entrance at all stages and in all weathers a depth as much as 35 feet at mean lower low water.

3. Having in mind the fact that this is the nearest Pacific home port to the Panama Canal, and that vessels drawing as much as 30 feet will engage in trade which will bring them close to this harbor and into which they would come for various purposes if sufficient depth were available, the district officer is of opinion that it is advisable for the United States to provide some increase of navigation facilities at this locality. Following the suggestion made in his report on preliminary examination, the papers in the case were referred to the Navy Department for an expression of its views as to the further improvement, if any, required in the interests of the Navy. Estimates are now submitted for the work required in the interests of commerce and that suggested by the Navy as follows:

(1) Bar channel 35 feet deep, and middle ground channel 32 feet deep, as formerly suggested by the Navy Department	$208,786
Annual maintenance of above	19,289
(2) Bar channel 40 feet deep, and middle ground channel 35 feet deep over limits now suggested by the Navy Department, as indicated on map	1,063,696
Annual maintenance of above	47,533
(3) Bar channel 40 feet deep, and middle ground channel 35 feet deep within limits indicated on map	388,637
Annual maintenance of above	22,067

4. The district officer is of opinion that the cost of further improvement in accordance with the first estimate given above, viz, $208,786, with $19,289 yearly for maintenance, is reasonable in comparison with the advantages to be obtained, and the work is reported by him as worthy of being undertaken by the United States in the interests of commerce. He makes no recommendation as to the adoption of the project desired by the Navy Department, and calls attention to the fact that the cost of the work on the middle ground may be reduced nearly $700,000 by the third plan and estimate above referred to, and states: "This plan will afford a safe entrance to capital ships of the Navy and is inferior to the Navy plan only in affording a less convenient approach to the Navy coal wharf."

5. After consideration of all data available, including that bearing upon the extensive terminal development proposed by and at the expense of the city of San Diego, the board concurs with the district officer in believing that some increase of depth at this harbor is warranted by the present and prospective demands of commerce. It believes that the plan contemplating a depth of 35 feet on the bar and 32 feet across the middle ground will reasonably well provide for these demands, and it is therefore of opinion that it is advisable for the United States to undertake this improvement, at an approximate estimated cost of $210,000, with $20,000 annually for maintenance. The full amount of the estimate should be provided in one appropriation.

6. It is recommended that the accompanying correspondence, setting forth the views of the Navy Department respecting its needs, be forwarded with this report for the information of Congress.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated there-

with to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SAN DIEGO HARBOR, CAL.

United States Engineer Office,
Los Angeles, Cal., November 25, 1912.

From: Lieut. Col. C. H. McKinstry, Corps of Engineers.
To: The Chief of Engineers, United States Army.
(Through division engineer.)
Subject: Preliminary examination of San Diego Harbor, Cal.

1. This is a report on a preliminary examination of San Diego Harbor, Cal., including both the inner harbor and the bar entrance, called for by the river and harbor act approved July 25, 1912, and department letter of August 3, 1912.

2. The accompanying drawing[1] shows San Diego Harbor and its location with respect to other harbors, etc., in southern California. San Diego is 11 nautical miles north of the United States-Mexico boundary and 89 and 482 miles south of Los Angeles and San Francisco Harbors, respectively. The only railroad leading to it, except short local lines, is the branch of the Atchison, Topeka & Santa Fe from Los Angeles via Santa Ana. The San Diego & Arizona Railroad is under construction between San Diego and Yuma via El Centro (Imperial Valley).

3. The entrance to San Diego Harbor is fortified.

4. In the following-named documents and in the Annual Reports of the Chief of Engineers will be found information relating to physical and commercial conditions at San Diego Harbor: House Documents No. 177, Fiftieth Congress, first session; No. 961, Sixtieth Congress, first session; Senate Document No. 25, Forty-first Congress, second session.

5. The total amount spent by the United States on this harbor to date is $809,820.24. With this amount a dike has been built to divert the San Diego River from San Diego Bay into False Bay; 18.85 acres of land has been purchased on North Coronado Beach Island; a jetty 7,500 feet long has been built to the height of extreme high water; and 475,228 and 688,873 cubic yards have been dredged from the middle ground and outer bar channels, respectively. On completion of the last dredging contract, May 3, 1912, the channel through the outer bar was 30 feet deep over a width of 600 feet and 32 feet deep over a width of 300 feet at mean lower low water. The channel through the middle ground was 30 feet deep, its width increasing from 700 feet at the southerly end to 1,000 feet at the northerly end. The average height of the high waters above the plane of reference is 4.8 feet. The average of the higher high tides is 5.5 feet. For present channels see map herewith.

6. The act directing the preliminary examination does not specify the extent of the further improvement contemplated. The desires of interested parties as developed by conferences and by a public

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[1] Not printed.

hearing held at San Diego October 16, 1912, are set forth in the accompanying[1] papers, viz: "Report on San Diego Harbor respectfully submitted by the leading business and civic organizations of San Diego, Cal." dated October 16, 1912; letter dated October 16, 1912, from Wide-Awake Improvement Club of San Diego, Cal.; letter dated October 16, 1912, from Capt. A. J. Foster, harbor master, San Diego, Cal. Attention is invited particularly to the first mentioned of these inclosures.

7. Omitting minor work in the inner harbor, the request of the community is that the United States open the harbor to ships drawing 35 feet by providing a channel across the outer bar about 1,000 feet wide and 40 feet deep and one across the "middle ground" of corresponding depth (say, 37 feet) and wide enough for convenient use by naval vessels approaching and leaving the Navy coal dock.

8. The commercial statistics of the port for the calendar year 1911 are given at the end of the inclosure[1] entitled, "Report on San Diego Harbor respectfully submitted by the leading business and civic organizations of San Diego, Cal." The diagram with the annual report of the Chief of Engineers for 1912 shows that there has been a considerable increase in freight tonnage and especially in freight value during the last few years.

9. At present the exports from San Diego are mostly the productions of the fields, vineyards, and orchards of a small area of country in close proximity to the city. The more important imports are building materials, fuel (coal, coke, oil), and general merchandise (miscellaneous articles of every description required by a prosperous, rapidly growing, nonmanufacturing community). These articles are distributed to a larger area than that from which the exports are collected. A considerable quantity of general merchandise brought in by large vessels is either transferred to rail for Los Angeles and neighboring cities or to smaller vessels for coast points (Ventura and Santa Barbara).

10. The Panama Canal and the building of the new railroad from San Diego to Yuma are the foundation on which this community bases its expectation of a large increase in the business of the port. It is preparing for this business by constructing a municipal terminal at a cost of $1,000,000. The canal will shorten water routes to this port, as to all other ports on this coast. The completion of the railroad will make San Diego the terminus of a transcontinental line and will add to it as a "back country" the Imperial Valley and part of Arizona and New Mexico.

Table of distances.

From—	To—	Via—	Distance in miles.
Phoenix (Salt River project)	Los Angeles Harbor	Atchison, Topeka & Santa Fe Ry.	511
Phoenix	do	Southern Pacific	471
Do	San Diego Harbor	Southern Pacific and San Diego & Arizona (building).	[2] 385
Yuma	Los Angeles Harbor	Southern Pacific	271
Do	San Diego Harbor	San Diego & Arizona (building).	[2] 195
El Centro	Los Angeles Harbor	Southern Pacific	237
Do	San Diego Harbor	San Diego & Arizona (building).	[2] 122

[1] Not printed.

[2] About.

It is fair to presume that the building of the new railroad will add greatly to the commerce of the port.

11. The $1,000,000 above referred to is being expended by the city in the construction of a pier 800 feet long and 130 feet wide at the foot of D Street, and a bulkhead about 2,500 feet long extending northerly from the pier. On either side of the pier a depth of 35 feet and from the pier to deep water in the bay a depth of 30 feet is to be provided. The space in rear of the bulkhead, amounting to about 60 acres, is to be filled to street level and along the front of the bulkhead dredging is to be done to the depth of 20 feet. Unloading devices on the pier and warehouses, etc., on the fill are also to be provided. This terminal should reduce the time and cost of discharging and taking on freight, and do much to draw commerce to the port.

12. Besides the municipal terminal and certain private lumber and oil wharves the more important existing wharves are the coal wharf at the foot of G Street, the two "Santa Fe" wharves, and the Pacific Coast Steamship Co.'s wharf. There is 25 feet alongside the coal wharf; 25 and 30 feet alongside the Santa Fe wharves, respectively, and 24 feet alongside the Pacific Coast Steamship Co.'s wharf. The tracks of the Atchison, Topeka & Santa Fe Railway run out on the coal wharf and the southerly Santa Fe wharf. These terminals are hardly adequate to the demands upon them.

13. The San Diego bar is generally smooth; the middle ground channel always so. The present channels are of such capacity that at low water, in ordinary weather, vessels drawing 28 feet can safely enter and depart. In rough weather, however, it would not be safe for a vessel drawing over 25 feet to attempt to use the bar channel at low water. Present depths are more than ample for most of the vessels that trade between San Diego and points in California, Oregon, and Washington, but the ships of the American-Hawaiian Line, which ply between Salina Cruz and Honolulu, touching at San Diego, San Francisco, and Seattle, and which have been running to San Diego for 10 years, draw at present as much as 27 feet, and the new ships of that line will draw 29 or 30 feet, as I have been informed by the general manager of the company. These ships will require for the safe navigation of the entrance at all stages and in all weathers a depth as much as 35 feet at mean lower low water.

14. Upon the opening of the Panama Canal it will undoubtedly be the case that vessels drawing more than 30 feet will engage in trade between the Pacific ports of North America and Asia and the Atlantic ports of North, Central, and South America, and Europe. These vessels will pass close to San Diego Harbor, and would probably stop there to deliver and receive freight and for other purposes if the increased depth asked for be provided. But it is not thought that for the immediate future at least the volume of such commerce would justify the cost of so great an improvement or that the freight rate to San Diego by vessels of the largest size would be materially less than that by vessels drawing, say, 30 feet.

15. In spite of the arguments contained in the inclosures, there would therefore appear to be no immediate prospective need, at least no adequate need, for entrance channels capacious enough for vessels drawing 35 feet. (See par. 7 above.) I am of opinion, however, that it would be advisable for the United States to provide channels required by vessels drawing 30 feet, if the cost of the work

is not out of proportion to the benefits that may be expected to follow. The bar channel should be about 600 feet wide and 35 feet deep. The middle-ground channel should be 32 feet deep. The original deepening should be to somewhat greater depths than stated, to allow for deterioration. As regards the proper width of channel across the middle ground, attention is invited to correspondence with the Navy Department, attached to the report on the preliminary examination directed by the river and harbor act of March 2, 1907, and published in House Document No. 961, Sixtieth Congress, first session. The funds available under the last project did not permit dredging to be done as far east as the line indicated by the Navy Department (see map herewith), but any increased depth provided over the middle ground should extend to the line referred to.

16. It is suggested that the matter of obtaining an increased depth in the entrance to this harbor be again referred to the Navy Department, either now or upon the submission of the report of the survey, if one is ordered, in order that the needs of the Navy at this place may receive full consideration. The early completion of the Panama Canal, the fact that this is the nearest home port thereto on the Pacific coast, and that it is a fortified port, may possibly make advisable for naval purposes a greater increase in the depth of the entrance than is above referred to.

17. I recommend that I be authorized to make the survey required to obtain the data necessary for the preparation of a project for obtaining the channels referred to in paragraph 15 and an estimate of the cost thereof.

18. There is no question in this case of the development or utilization of water power for industrial or commercial purposes, or of any other subject than those discussed above.

C. H. McKinstry.

[First indorsement.]

United States Engineer Office, Pacific Division,
San Francisco, Cal., November 29, 1912.

To the Chief of Engineers, United States Army:

Concurring in the views expressed by the district officer.

Thos. H. Rees,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 10, 1912.

To the Chief of Engineers, United States Army:

For reasons stated herein, the board concurs with the district officer and the division engineer in recommending a survey in order to determine the extent and advisability of the improvement. It is recommended that the views of the Navy Department be obtained before the survey is made and that the district officer submit estimates for the improvement desired by that department, as well as for the improvement that he believes necessary for commercial purposes.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT OF SURVEY OF SAN DIEGO HARBOR, CAL.

UNITED STATES ENGINEER OFFICE,
Los Angeles, Cal., January 9, 1913.

From: Lieut. Col. C. H. McKinstry, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through Division Engineer).
Subject: Report of survey, San Diego Harbor, Cal.

1. This is the report, with estimates of cost, called for by department letter of December 20, 1912, on (*a*) deepening the middle ground to 32 feet and the outer bar channel to 35 feet, and (*b*) deepening the middle ground to 35 feet and the outer bar channel to 40 feet, San Diego Harbor.

2. No field work was required for making estimates of the quantities to be removed either on the middle ground or on the bar, existing maps being sufficient for the purpose.

It was considered advisable, however, to make a certain number of probings to determine whether a channel 40 feet deep could be obtained without encountering material that could not be economically removed with a self-propelling suction dredge. These probings were made between January 4 and 7, 1912, and nothing but sand was met with.

MIDDLE GROUND.

3. The areas over which an increased depth is figured on for the middle ground are indicated on the accompanying tracing. Plan A contemplates a depth of 32 feet over the area recommended in the report on the preliminary examination dated November 25, 1912; plan B is the plan recommended by the Navy Department December 19, 1912, and contemplates a depth of 35 feet; plan C contemplates 35 feet over the area of plan A. To allow for changes that may take place between now and the time when the new work is begun, the depths used in the estimates are 34 feet in plan A and 37 feet in plans B and C, and 20 per cent is added in each case to allow for material that may be stirred up and redeposited within the limits of the area dredged during the time the work is going on. The quantities to be removed are given in Table I below.

4. It is not seen how any assistance can be given this work by the construction of jetties or training walls; it is a case for dredging alone. In all dredging work previously done on the middle ground suction dredges have been used and the material has been deposited at sea. In the new work considered the material might be pumped ashore on Coronado Beach Island, assuming that the owners would permit the same, or encourage it by the construction of dikes or bulkheads, and in this case a lower price might be obtained than those assumed in the following paragraph:

5. The price paid for dredging on the middle ground has ranged from 14.89 cents to 65 cents per cubic yard. Under the contract recently completed, which included dredging on outer bar as well as on middle ground, the price was 14.89 cents per cubic yard. The dredge used was a self-propelling hopper suction dredge. It will not be safe to assune that so low a price can be obtained again. Twenty-five cents will be assumed for Plan A and 20 cents for the larger quantities involved in Plans B and C. Adding 10 per cent

for engineering and contingencies, the cost will then be as in Table I below.

6. These increased depths will, of course, not maintain themselves. Past experience at this place indicates, however, that deterioration will not be rapid. It will probably be three or four years before any maintenance work will be needed, and it may be assumed that thereafter the maintenance of the project depths may be effected by the removal at intervals of a few years of a quantity of material that will average yearly the quantity represented by a depth of one-half foot over the entire area. The cost of this dredging, taken at 25 cents per cubic yard, is given in Table I.

TABLE I.—*Middle ground.*

(A) (Limits as suggested by Navy Department in 1908; depth, 32 feet.) 363,222 cubic yards, at 25 cents, $99,886. Maintenance, $6,789 a year.

(B) (Limits as suggested by Navy Department, 1912; depth, 35 feet.) 3,744,320 cubic yards, at 20 cents, $823,750. Maintenance, $32,255 a year.

(C) (Limits, same as in Plan A; depth, 35 feet.) 675,872 cubic yards, at 20 cents, $148,691. Maintenance, $6,789 a year.

OUTER BAR.

7. The deepening of a bar channel may be accomplished by dredging alone or by dredging in connection with a jetty or jetties. No ocean bar more favorable than this one for the use of dredging alone is known. Storms are rare, and the experience already had indicates that dredged channels deteriorate but slowly. The present channel is 30 feet deep and 600 feet wide. It will be assumed that the increased depths are to be obtained within the width of the present channel. The channel 37 feet deep would then be 570 feet wide at the bottom (Plan A′) and the channel 42 feet deep, 540 feet wide at the bottom (Plan B′). Adding in each case 20 per cent for accretions during the progress of the work, the quantities to be removed under the two plans will be as given in Table II below. All dredging previously done on this bar has been done with self-propelling suction dredges, and the price has ranged from 14.89 cents to 60 cents per cubic yard. Under the last contract the price was 14.89 cents per cubic yard. It will not be safe to assume that so low a price will be obtainable again; 25 cents will be assumed for Plan A′ and 20 cents for the larger quantity to be removed under Plan B′. The first cost of the work, 10 per cent being added to cover engineering and contingencies, will then be as in Table II.

8. The forces which formed the present bar and which seem to be in equilibrium when the bar carries about 21 feet of water, will continue to strive for that depth, and maintenance dredging will be required from time to time to restore any deeper artificial channel. It is not possible to calculate accurately the amount of maintenance dredging that will be necessary. Guided, however, by the behavior of bar channels previously dredged at this place, it will be assumed that the deepened channels will require for their maintenance the periodical removal of a quantity of material that will average yearly the quantity represented by a depth of one-half foot over the entire area of the channel. The maintenance dredging being small in quantity will be assumed to cost 25 cents per cubic yard.

TABLE II.—*Outer bar.*

Plan A'.—Channel 35 feet deep and 570 feet wide at bottom; 396,000 cubic yards; cost, $108,900; maintenance, $12,500 a year.

Plan B'.—Channel 40 feet deep and 540 feet wide at bottom; 1,090,666 cubic yards; cost, $239,946; maintenance, $15,278 a year.

9. The total cost of the various plans will be:

Bar channel, 35 feet deep, and middle ground channel, as in Plan A, 32 feet deep, $208,786, with $19,289 yearly for maintenance.

Bar channel, 40 feet deep, and middle ground channel, as in Plan B, $1,063,696, with $47,533 yearly for maintenance.

Bar channel, 40 feet deep, and middle ground channel, as in Plan C, $388,637, with $22,067 yearly for maintenance.

10. Past experience at this place indicates that dredging may be counted on to obtain and maintain either the 35 or the 40 foot channel. Jetty work should not be considered until the dredging method has been tried and found unsuccessful. The building of jetties across the bar would probably not cause a channel 40 feet, or even 35 feet deep, to scour; dredging would have to be resorted to in addition. But should twin jetties be built and either channel dredged, deterioration would be slower than in the case of a dredged channel unprotected by jetties. It is doubtful, however, whether an east jetty alone would have any such effect, and an extension of the east jetty might cause a recession of the Coronado shore. A west jetty would protect the dredged cut from material that would otherwise be washed into it in westerly and southwesterly storms. Should jetties be built at this place, the west one should be built first and the present east jetty should not be extended until the need of extending it had manifested itself.

11. The report on the survey called for by the river and harbor act of March 2, 1907, is printed in House Document No. 961, Sixtieth Congress, first session, and contains a discussion of the cost of obtaining a 30-foot channel by dredging alone and by jetties supplemented by dredging. This discussion shows that the advantage is with the method by dredging alone. A similar discussion applied to 35 and 40 foot channels would show that the advantage of the dredging method increases with the depth desired. Under the jetty plus dredging method there would doubtless be less maintenance dredging, but the saving thus made would be much more than offset by the interest on the cost of the jetties. This excess of interest over the cost of maintenance dredging would be much greater for the 40-foot channel than for the 35-foot channel.

12. The recommendation made in the report on preliminary examination was that channels capacious enough for vessels drawing 30 feet were commercially advisable, provided the cost of obtaining such channels was not excessive. The reasons there given were, briefly, a probable increase in the volume of commerce and in the size of ships, the building of a municipal terminal at a cost of $1,000,000, and naval convenience. It is believed that the cost estimated above, viz, $208,786, with $19,289 yearly for maintenance, is reasonable in comparison with the advantages to be obtained, and the work is therefore reported as worthy of being undertaken by the United States.

13. Respecting the plan of the Navy Department, the General Board in its report of December 19, 1912, says:

> For all the reasons outlined above it is desirable that a depth of 35 feet over the middle ground and 40 feet over the bar be provided to permit the entrance at all times to the inner harbor of capital ships of the Navy, which will probably draw as much as 32 feet in the next designs. The channel opposite the naval coaling wharf should be widened and straightened to permit an easy turn of vessels of great length and draft. * * *

14. The estimated cost of this plan is $1,063,696, with $47,533 a year for maintenance. In view of the above-quoted extract it is difficult to believe that this cost is excessive. It may, however, be pointed out that the removal of the shoal opposite the Navy coaling wharf is less important than deepening the channel across the middle ground. The purpose of removing this shoal is declared by the General Board to be "to permit an easy turn of vessels of great length and draft." By adopting plan C (par. 3) for the middle ground, the cost of the work on the middle ground may be reduced nearly $700,000; as given in paragraph 9, the cost of obtaining a bar channel 40 feet deep and a middle-ground channel 35 feet deep and of the same width as that contemplated in plan A (par. 3) will be $388,637, with $22,067 yearly for maintenance. This plan will afford a safe entrance to capital ships of the Navy and is inferior to the Navy plan only in affording a less convenient approach to the Navy coal wharf.

15. If either the first or the third project, paragraph 9, should be adopted, the full amount of the estimate ($208,786 or $388,637) should be appropriated in one sum. In the case of the second project the initial appropriation should be $550,000, and beginning two years thereafter the remainder should be provided in two equal appropriations one year apart.

16. The papers setting forth the views of the Navy Department on the improvement of this locality, which were forwarded with department letter of December 20, 1912, are returned herewith.

C. H. McKinsely.

[First indorsement.]

United States Engineer Office, Pacific Division,
San Francisco, Cal., January 13, 1913.

To the Chief of Engineers, United States Army:

1. Concurring in the views of the district officer.

2. The prospective requirements of commerce in this harbor for a number of years will be met by a depth of 32 feet in the middle-ground channel and a depth of 35 feet on the outer bar.

3. In view, however, of the statements of the Navy Department, it is believed that the requirements of that department should be fully met by the adoption of plan B for the middle ground and of plan B for the outer bar.

Thos. H. Rees,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors on survey see p. 3.]

LETTER FROM CHIEF OF ENGINEERS TO THE SECRETARY OF WAR.

War Department,
Office of the Chief of Engineers,
Washington, December 16, 1912.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Improvement of San Diego Harbor, Cal.

1. Among the localities for which preliminary examinations and surveys were authorized by the act of July 25, 1912, was "San Diego Harbor, Cal., including both the inner harbor and the bar entrance."

2. The report on preliminary examination has just been received at this office and recommends that a survey be made in order to determine the extent and advisability of the improvement.

3. As it is thought that the Secretary of the Navy may be possibly interested in the proposed improvement, it is suggested that he be requested to advise you of his wishes in the matter, and for a clear understanding of the matter it is suggested that the improvement desired by him, if he desires anything, be indicated upon one of the accompanying blue prints, and that it be returned with his letter expressing his views.

W. H. Bixby,
Chief of Engineers, U. S. Army.

[First indorsement.]

War Department, *December 16, 1912.*

To the Secretary of the Navy, with request for his views and wishes in the matter.

Early action in the matter will be appreciated.

Robert Shaw Oliver,
Assistant Secretary of War.

[Second indorsement.]

December 17, 1912.

From: Secretary of the Navy (Division of Operations).
To: The President General Board.
Subject: Improvement of San Diego Harbor.

1. Referred for recommendation as to the improvements which should be indicated, as suggested in paragraph 3 of this letter.

G. v. L. Meyer.

[Third indorsement.]

December 19, 1912.

From: President General Board.
To: Secretary of the Navy.
Subject: Improvement of San Diego Harbor.

Returned.

2. The geographical situation of San Diego, 450 miles south of San Francisco, close to the Mexican border, and the nearest United States port to Panama on the Pacific coast, points to its being a frequent port of call for the Navy as well as for commercial vessels when the canal is in operation. The Navy now has a coaling wharf at San

Diego, and the harbor is used as a base for a part of the drills of the Pacific Torpedo Flotilla; the capital ships of the Pacific Fleet are at this date engaged in target practice in the immediate vicinity. The General Board believes it probable that the naval use of this port will increase in the future rather than the reverse. There is room in the inner harbor for at least 16 capital ships in quiet, perfectly protected water, and there is now a limited coast defense.

3. For all the reasons outlined above it is desirable that a depth of 35 feet over the middle ground and 40 feet over the bar be provided to permit the entrance at all times to the inner harbor of capital ships of the Navy, which will probably draw as much as 32 feet in the next designs. The channel opposite the naval coaling wharf should be widened and straightened to permit an easy turn of vessels of great length and draft. The General Board therefore recommends the survey mentioned in paragraph 2 of the letter of the Chief of Engineers. The limits of the desired channel are shown on the accompanying blue print.

4. In its letter, No. 404, of March 18, 1909, the General Board adheres to its "opinion, heretofore expressed, that it is not good policy, economical, or desirable, from a naval standpoint, to establish a naval station on the coast of California south of San Francisco." The expressions above regarding the desirability of having the inner harbor of San Diego available for capital ships of the Navy are not to be taken as a reversal of opinion in this respect.

GEORGE DEWEY.

NAVY DEPARTMENT,
December 19, 1912.
Approved.

BEEKMAN WINTHROP,
Acting Secretary of the Navy.

LETTER OF ACTING SECRETARY OF THE NAVY TO SECRETARY OF WAR.

NAVY DEPARTMENT,
Washington, December 19, 1912.

From: Acting Secretary of the Navy.
To: The honorable the Secretary of War.
Subject: Improvement of San Diego Harbor.

1. Referring to a letter from the Chief of Engineers, United States Army, of recent date, forwarded by you, relative to the improvement of San Diego Harbor, there is forwarded herewith the original papers in this matter with the recommendation of the General Board, which has been approved by this Department.

2. It is requested that these papers be returned when they shall have served their purpose.

BEEKMAN WINTHROP.

SAN DIEGO HARBOR. CAL.

House Doc. No. 1309 ; 62d Cong., 3d Sess.

SAVANNAH RIVER AT AUGUSTA, GA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF SAVANNAH RIVER AT AUGUSTA, GA., WITH A VIEW TO DETERMINING WHAT IMPROVEMENTS ARE NECESSARY IN THE INTEREST OF NAVIGATION BY WAY OF ENLARGING AND EXTENDING THE PROJECT AUTHORIZED BY THE RIVER AND HARBOR ACT APPROVED JUNE 25, 1910.

January 31, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, January 30, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 29th instant, together with copies of reports from Col. Dan C. Kingman, Corps of Engineers, dated November 30 and December 27, 1912, on preliminary examination and estimate of cost of improvement, respectively, of Savannah River at Augusta, Ga., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, January 29, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Savannah River at Augusta, Ga.

1. There are submitted herewith, for transmission to Congress, reports dated November 30 and December 27, 1912, by Col. Dan C.

Kingman, Corps of Engineers, on preliminary examination and estimate of cost of improvement, respectively, of Savannah River at Augusta, Ga., with a view to determining what improvements are necessary in the interest of navigation by way of enlarging and extending the project authorized by the river and harbor act approved June 25, 1910, called for by the river and harbor act approved July 25, 1912.

2. The present project for the improvement of this locality, adopted by the act of June 25, 1910, provides for protecting from erosion the bank of the river for a distance of 7,900 feet between Hawks Gully and the steamboat landing at Fifth Street, in the city of Augusta, at an estimated cost of $250,000, contingent upon the contribution of one-half of this sum by local interests. The necessary funds were furnished by the city, and the work is about three-fourths completed. The plan provides for protection of the bank up to the 25-foot contour on the Augusta gauge. The work now desired is the extension of the protective work up to the crest of the bank and downstream to East Boundary Street. For this improvement the district officer submits the following estimate of cost:

For extension of bank protection to East Boundary Street, work to be similar to existing plan	$120,000
For extending pavement up to crest of the bank over work now authorized	91,000
For extending pavement to crest of the bank for proposed new work	23,500
Total	234,500

The work is of a character to require very little maintenance under normal conditions, and no estimate of the cost of maintenance is submitted. The district officer believes that the work outlined is desirable under the condition that the city of Augusta pay one-half the cost.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 14, 1913. After consideration of all information available, the board has reached the conclusion that the extension of the protective work from Fifth Street to East Boundary Street to a height of 25 feet on the Augusta gauge, at a total estimated cost of $120,000, is advisable on the condition that one-half of this cost be contributed by the city of Augusta or other local interests. The board does not believe that it is advisable for the United States to extend the existing or proposed pavement up to the crest of the bank, believing that the benefits from such work would accrue almost entirely to local interests and but little, if any, to general commerce and navigation.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Savannah River at Augusta, Ga., is deemed advisable to the extent of extending the bank protection work from Fifth Street to East Boundary Street, Augusta, to a height of 25 feet on the Augusta gauge, at an estimated cost of $120,000 for first construction, provided $60,000 be contributed by the city of Augusta or other local interests, this estimate being based on the supposition that the construction work will, as now seems desirable and advantageous,

be prosecuted under a first appropriation of $60,000, being the full share of the cost of the work to be borne by the United States under the recommended plan of cooperation.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
January 14, 1913.

To the Chief of Engineers, United States Army:

1. The act of June 25, 1910, adopted a project for improvement of Savannah River at Augusta, consisting in protecting from erosion the bank of the river for a distance of 7,900 feet between Hawks Gully and the steamboat landing at Fifth Street, in the city of Augusta, at an estimated cost of $250,000, contingent upon cooperation by local interests to the extent of bearing one-half of the estimated expense. The necessary funds were contributed by the city, and the work is reported to be about three-fourths finished.

2. The approved plan provides for protection of the bank up to a height of 25 feet on the Augusta gauge, or about 18 feet above the level of summer low water. It appears that since the work was started there have been four freshets which carried the water surface above 25 feet on the gauge, and while no damage to the work was occasioned, the district officer suggests the advisability of carrying the protection up to the crest of the bank, in order to form a more stable improvement. He regards the extension of suitable bank protection from the steamboat landing at Fifth Street down to East Boundary Street, however, as the first and most important piece of work to be done. The following estimates are submitted:

For extension of bank protection to East Boundary Street, work to be similar to existing plan	$120,000
For extending pavement up to crest of the bank over work now authorized	91,000
For extending pavement to crest of the bank for proposed new work	23,500
Total	234,500

The work is of a character to require very little maintenance under normal conditions, and no estimate of the cost of maintenance is submitted. The district officer recommends that all of the work be done under the condition that the city of Augusta pay one-half the cost.

3. The board has considered all information available, and has reached the conclusion that the extension of the protective work from Fifth Street to East Boundary Street is advisable on the condition that one-half the cost be contributed by the city of Augusta or other local interests. It believes that this work should be built to the same height as that now in progress above, viz, 25 feet on the Augusta gauge, at an estimated cost of $120,000. The full share of the expense to be borne by the United States, $60,000, should be provided in one appropriation.

4. The board does not believe that it is advisable for the United States to extend the existing or proposed pavement up to the crest of

the bank, believing that the benefits of this work would accrue almost entirely to local interests, and but little, if any, to general commerce and navigation.

5. In compliance with law, the board reports that except as contemplated by the above recommendations, there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SAVANNAH RIVER AT AUGUSTA, GA.

War Department,
United States Engineer Office,
Savannah, Ga., November 30, 1912.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army, Washington, D. C.
Subject: Preliminary examination of the Savannah River at Augusta, Ga.

1. The river and harbor act approved July 25, 1912, provides for a preliminary examination of the Savannah River at Augusta, Ga., with a view to determining what improvements are necessary in the interest of navigation, by way of enlarging and extending the project authorized by the river and harbor act approved June 25, 1910.

2. The project referred to in the act will be found printed in House Document No. 487, Sixty-first Congress, second session. It is a report and recommendation resulting from a survey called for by the river and harbor act of March 3, 1909. The work of improvement which this project provides for consists in protecting from erosion 7,900 feet of the bank of the Savannah River, lying between Hawks Gully and the steamboat landing at Fifth Street, in the city of Augusta. This bank is subject to very severe attacks from the strong current which impinges upon it in time of freshets, and much valuable land has been washed away and large quantities of material in time past have been dumped in the river and have furnished much of the sand and gravel of which the bars are made.

3. The plan of improvement consists in excavating a trench, 10 feet wide, at the water's edge, at ordinary summer low water, at the base of the sloping bank. The trench is carried down to a depth of 12 feet, or to the natural rock of the bottom if it is sooner encountered. It is immediately filled with pieces of stone of sizes and weight sufficient to resist the current. This forms the toe of the pavement. The pavement is carried up the bank to a height of 25 feet on the Augusta gauge, or about 18 feet above the level of summer low water. It is placed upon the natural bank, which is simply smoothed off to receive it, and it consists of a layer of broken stone, 6 inches thick, upon which a covering of large blocks of stone is laid. Upon the upper portion of the work, where the exposure was the

greatest, the top pavement was 18 inches thick but was subsequently reduced, further downstream, to a thickness of 12 inches, which appears to be ample for all purposes of stability. Above the pavement and up to the top of the bank, it is proposed simply to smooth off the natural surface and to plant it with Bermuda grass, and to encourage the growth of a good strong sod upon it. Observation extending over a period of 33 years indicated that the river only rose above the level of 25 feet on an average of once or twice in a year, and only remained above it a very few days, generally not more than one or two. It was thought that the sod would resist the action of the water for this short period and that no great damage would result to it from the freshets.

4. This work of paving is still in progress and is about three-quarters finished. Since the work was started there have been four freshets which carried the water surface above 25 feet on the gauge. One of these carried it up to 36 feet, which was within less than 3 feet of the maximum. No injury whatever resulted to the completed pavement in consequence of these freshets and the erosion above the 25-foot line was insignificant, although the surface had not yet been graded and sodded, thus justifying, as far as it might, the plan upon which the work was being done.

5. Now, the present act of Congress requires a further examination, with a view to determining what enlargement and extension of the project thus described is necessary in the interest of navigation. It is proper to say that, owing to the expense of this work, half of which is borne by the city of Augusta, only so much length of front was covered by the original project of improvement as was considered absolutely necessary. There is no doubt that it would be desirable to extend this protection about 3,500 feet further downstream. This covers a bend in which caving is taking place and also extends down to the city limits in that direction. This bend will have to be protected in some way under the general project for improving the river. If the bedrock is deep enough to permit, it might be protected by piling and fascines following the method used on other portions of the river. If there is not enough depth to hold the piles, then this method would not answer. This can only be determined by an examination. A protection by hand-laid riprap, founded upon a rock-filled trench, is incomparably better than any arrangement of brush and piling and has the special advantage, in the vicinity of a city, that it permits the development of wharves, the construction of warehouses, and the convenient landing of steamboats. If the city paid one-half the cost of the work, as it is prepared to do, the remaining half would probably still considerably exceed the cost of the pile and brush protection, but, under the circumstances, I think it is worth the difference and I am prepared to recommend that it be done, but I would recommend first an examination to ascertain whether piling could be driven, for, if it could not, it would force some form of riprap or pavement, and it would be well, in the interests of economy, to adopt a method of protection in which the city would be willing to share.

6. Now, the other enlargement or extension which is desired consists in extending this pavement which, as already described, terminates at the 25-foot contour, up to the natural crest of the bank, which is about 10 feet higher. This would make a much better and

more efficient job than it would to leave the top of the slope simply a sodded earthen embankment. It would permit the city to crown the natural crest of the bank with a levee adequate to protect it from overflow. It would protect the levee from the danger of being undermined, whereby a crevasse might be formed in time of freshet which would result in great loss and damage to the city and might involve the works of improvement themselves.

7. This seems to be rather a question for Congress than a strictly engineering one. It is a question of how far the General Government is ready to go in assisting a community like this in protecting itself from the disasters of a flood. There is an abundant precedent for such work in the construction of levees on the Mississippi River. The cost of what it is desired to have done would not be very great, and if the city paid half it would, of course, be proportionately reduced.

8. If so directed, I can prepare plans and an estimate of cost of doing any or all of the work which I have described. No new survey will be necessary, but the necessary drafting and computation will cost $100. I would recommend that the preparation of a plan and estimate be authorized.

9. A map[1] is transmitted herewith, which shows the location of the work being done under the present project. It also shows where the proposed work would be located. Letters from the mayor of Augusta and the city engineer and commissioner of public works are inclosed.

DAN C. KINGMAN.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 16, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer, who is also division engineer, in recommending a survey in order to determine the extent and advisability of the improvement.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT ON SURVEY OF SAVANNAH RIVER AT AUGUSTA, GA.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., December 27, 1912.

From: Col. Dan C. Kingman, Corps of Engineers, U. S. Army.
To: The Chief of Engineers, U. S. Army, Washington, D. C.
Subject: Survey and estimate of cost of improving Savannah River at Augusta, Ga.

1. In obedience to instructions contained in department letter of December 19, 1912, I submit the following plan and estimate of cost of

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[1] Not printed.

he improvement of the Savannah River at Augusta, Ga., in the manner described in the preliminary report of November 30, 1912.

2. The first and most important piece of work to be done is the extension of suitable bank protection from the steamboat landing at Fifth Street down to East Boundary Street, a distance of 3,500 inear feet of bank. It may be stated that an examination indicates hat there is probably sufficient soft material overlying the rock along the foot of the bank to give piles a holding penetration, nevertheless, on account of the many advantages presented by the stone bank protection, it is thought better to use it and it is recommended for this locality.

3. The plan of improvement consists in excavating a trench 10 feet wide at the bottom, beginning at the water's edge at ordinary summer ow water, at the foot of the bank to be protected. The trench is to be carried down to a depth of 12 feet below the low water surface, unless rock is sooner encountered. The side slopes are to be as steep as they will stand, and the trench is to be immediately filled with pieces of stone of sizes and weight sufficient to resist the current; this forms the toe of the slope. The upper surface of the rock in the trench is made to conform in slope to the upper surface of the bank pavement prolonged. Above the layer of trench stone, the bank is to be smoothed off, but not graded to special surface, simply given a smooth and even surface, and upon this a layer 6 inches in thickness of broken stone is to be placed, and upon this a covering or pavement of blocks of stone 12 inches thick is to be hand laid, so as to give as close joints as possible. This pavement, in any case, should be carried up to the 25 foot contour. Above this, the bank may be smoothed up and planted with a good Bermuda sod.

4. This improvement will require about 15,000 cubic yard of trench excavation, 35,000 tons of trench rock, 5,700 tons of crushed stone, and 13,500 tons of paving stone. By comparison with existing prices and making due allowances for contingencies and for special difficulties of construction, the total estimated cost of the work is $120,000. If the work at present under construction from Hawks Gulley down to Fifth Street be extended up to the top of the bank, as desired by the city authorities, so as to permit the construction of levees for prevention of overflow, and if a style of construction be used for this pavement similar to that just described, the cost will be $91,000, and if the same style of protection is extended down over the new work to East Boundary Street, so as to make it comformable throughout, it will require an addition of $23,500, or, to summarize:

For extension of bank protection to East Boundary Street, according to existing plan	$120,000
For extending pavement up to the crest of the bank over work now authorized	91,000
For extending pavement to crest of the bank for proposed new work	23,500
In all	234,500

5. In the case of the present work, the city of Augusta is paying half of the cost. The money was deposited in the required manner before any work was done. If any or all of this work is undertaken, it is recommended that the same requirement be made. If all of the work is done, it will cost the United States $117,250 and the city of Augusta a like amount.

6. The work should be carried forward as rapidly as possible and should be completed in one year, so that the entire amount ought to be appropriated in a single appropriation. The work is of a character to require very little maintenance and no estimate for the cost of maintenance need be submitted. It would probably not cost anything for a number of years, unless some special mischance befalls it, in which case a special appropriation would have to be asked for.

7. The protection of this bank is of vital importance to the city of Augusta. It enables it to adopt rational measures for drainage and for the prevention of overflow. It would increase the wealth and prosperity of the city by permitting a more rapid growth of population and by allowing a style of construction of buildings which at present is unsafe, and it will enable additional wharves and terminal facilities to be constructed and greater use to be made of the river.

DAN C. KINGMAN.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

LETTER OF THE MAYOR OF THE CITY OF AUGUSTA, GA.

THE CITY COUNCIL OF AUGUSTA, GA.,
September 23, 1912.

SIR: Replying to your letter of the 19th instant, in reference to the extending of the project authorized by the river and harbor act approved June 25, 1910, which is the protection of the river bank along the city front:

The work that is now being constructed is paid for by the United States Government and the city of Augusta jointly, each paying one-half; and for this purpose the city of Augusta has paid into the United States Treasury $125,000, which is estimated to be one-half of the cost. This project calls for paving the bank with stone from low-water mark to 25-foot contour, from Hawks Gully down to Fifth (Center) Street. In order to make the protection complete, it is desired to continue the paving of the bank from Hawks Gully to Fifth (Center) Street from the 25-foot contour to the top of the bank; also the paving, from low-water mark to the top of the bank, that portion below Fifth (Center) Street down to East Boundary Street. The improvement is necessary in order to prevent the erosion of the bank and the carrying of the material eroded down the river, which will be deposited in the channel, necessitating constant dredging.

I trust that the Board of Engineers will approve of the construction of this project to the extent mentioned above, or farther if they deem it necessary, and for the purpose of carrying it out the city of Augusta will pay one-half of the cost of the improvement, the United States Government to pay the other one-half; or, in other words, the arrangements to be similar to that under which the work is being done, which was authorized by the river and harbor act approved June 25, 1910.

Yours, very truly,

THOMAS BARRETT, Jr., *Mayor.*

Mr. E. R. CONANT,
Principal Assistant Engineer, Savannah, Ga.

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LAKE CRESCENT AND DUNNS CREEK, FLA.

LETTER

FROM

THE ASSISTANT SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF LAKE CRESCENT AND DUNNS CREEK, FLA., FROM THE ST. JOHNS RIVER TO CRESCENT CITY.

JANUARY 31, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, January 30, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 30th instant, together with reports dated September 26, 1911, and July 10, 1912, with maps, by Capt. J. R. Slattery, Corps of Engineers, on preliminary examination and survey, respectively, of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City, made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

ROBERT SHAW OLIVER,
Assistant Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 30, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City.

1. There are submitted herewith, for transmission to Congress, reports dated September 26, 1911, and July 10, 1912, with maps, by

Capt. J. R. Slattery, Corps of Engineers, on preliminary examination and survey, respectively, of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City, called for by the river and harbor act approved June 25, 1910.

2. Dunns Creek is a connecting waterway between Crescent Lake and the St. Johns River, which it enters 7 miles above Palatka. It has a depth of about 12 feet, but there are several sharp bends which render navigation difficult. Crescent Lake has generally a similar depth, but near the entrance to Dunns Creek is a shoal having a depth of only about 6 feet. Dunns Creek and Lake Crescent lie in the drainage area of St. Johns River which flows in a northerly direction a distance of 62 miles from the mouth of Dunns Creek to Jacksonville and then in an easterly direction a distance of 27.5 miles emptying into the Atlantic Ocean. The controlling depth in St. Johns River is in excess of the depths recommended for Dunns Creek and Lake Crescent.

3. The district officer in his report on the survey submits a project for providing a channel with a depth of 10 feet and 100 feet wide at an estimated cost of $32,000, but in a supplemental report dated September 4, 1912, and forwarded herewith, he states that a channel 8 feet deep would provide for most of the existing boats. The cost of an 8-foot channel with three cut-offs, as suggested by the Board of Engineers for Rivers and Harbors, is estimated by him in a letter dated December 24, 1912, at $24,954. He believes that the improvement as thus modified is justified by present and prospective commercial interests, and in this opinion the division engineer concurs. The district officer also submits an estimate for a channel 6 feet in depth into Dead Lake at the upper end of Lake Crescent, but consideration of this improvement does not appear to be authorized by the wording of the act.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, to whose accompanying report of January 6, 1913, attention is invited. It is stated by the board that the information available indicates that the country is rapidly developing and that a moderate increase in commerce may be expected in the near future if suitable navigation facilities are provided. In connection with its consideration of the case, the board held a hearing in its office on December 9, 1912, and after consideration of all data available expresses the opinion that it is advisable for the United States to undertake the improvement of the locality under the modified project for a channel 8 feet deep and 100 feet wide, from St. Johns River into Lake Crescent, including three cut-offs, at a total estimated cost of $25,000 for original work and $1,000 annually for maintenance.

5. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City, is deemed advisable so far as to secure an available channel depth of 8 feet and a channel width of 100 feet, including the three cut-offs, following in general the methods described in the reports of the district officer as modified by the Board of Engineers for Rivers

and Harbors at an estimated cost of $25,000 for first construction and $1,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost of the improvement; the improvement to be made contingent upon the donation free of cost to the United States of the rights of way necessary for the proposed cut-offs.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 6, 1913.

To the Chief of Engineers, United States Army.

1. The district officer submits a report of survey of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City, with estimates of cost for a channel which will afford a navigable depth of 10 feet and a width of no less than 100 feet. The work involves dredging in the lower end of the lake at the entrance to the creek and the making of two cut-offs in the creek, the latter made necessary on account of very sharp bends. The estimate for this work, including engineering and contingencies, is $32,000. He also submits an estimate in the sum of $1,000 for a channel 6 feet in depth in the lower end of the lake to afford access to St. Johns Park and a section of country which will produce commerce logically tributary to the Dunns Creek improvement. He reported that both of these works are justified by present and prospective commercial interests, and in this opinion the division engineer concurs.

2. The wording of the act limits the consideration to the region between the St. Johns River and Crescent City, the estimate for which is $32,000. Not being convinced that so great a depth as 10 feet is required to meet the needs of commerce at this locality, the board addressed a letter to the district officer requesting further investigation of this question. The results of his further study are contained in his letter of September 4, 1912, forwarded herewith, in which he states that a channel 8 feet deep would provide for most of the existing boats, and recommends that such a channel be constructed at an estimated cost of 22,963, which amount is increased to $24,954 as a result of a later estimate, submitted at the request of the board, covering the making of three cut-offs instead of two, in order to effect a considerable improvement of the channel alignment. The division engineer concurs in believing this modified plan preferable.

3. In connection with the consideration of this case the board gave a hearing at its office on December 9, 1912, which was attended by Hon. D. U. Fletcher, United States Senate; Hon. N. P. Bryan, United States Senate; Hon. Frank Clark, Member of Congress, and Capt. A. B. Dunning. The information available to the board indicates that the country is rapidly developing and that a moderate increase in commerce may be expected in the near future if suitable navigation facilities are provided. The board therefore expresses the opinion that

it is advisable for the United States to undertake the improvement of Lake Crescent and Dunns Creek, Fla., under the modified project for a channel 8 feet deep from St. Johns River into Lake Crescent, including three cut-offs, at a total estimated cost of $25,000 for original work and $1,000 annually for maintenance. The entire sum should be made available in one appropriation.

4. In compliance with law the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF LAKE CRESCENT AND DUNNS CREEK, FLA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., September 26, 1911.

SIR: 1. In compliance with department letter dated August 4, 1910, directing preliminary examination of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City, authorized by the river and harbor act of June 25, 1910, I have the honor to submit the following report:

2. No previous preliminary examination has been made. The only survey that has been made in this vicinity was a reconnoissance sketch made in connection with tentative lines for the Trans-Florida Canal in February, 1910. The detailed preliminary examination was made by Mr. J. W. Sackett, assistant engineer, whose report is copied in part below:

Dunns Creek empties into the St. Johns River about 7 miles above Palatka. It forms the outlet to Lake Crescent and is 8¼ miles long. It varies in width from 150 feet to 600 feet, averaging about 300 feet. The fairway extends from shore to shore and the channel depth is in excess of 12 feet nearly all the way through the stream. Its course is mostly through cypress swamps, reaching higher land in a few places on either side. There are only two bends sharp enough to cause any difficulty in navigation. The upper entrance to the stream is obstructed by shoal water in Lake Crescent. At ordinary low stages of the water there is a depth of 6 feet over this shoal. Dunns Creek is tidal, and in ordinary stages of the water level flood current is perceptible throughout its length on each recurring tide.

Crescent Lake is about 14 miles long, and varies from about 1 mile to about 3 miles in width. The average width is about 2½ miles. The greater portion of the lake below Crescent City, about 8 miles above the lower or northerly end of the lake, is in excess of 12 feet in depth. The lake extends in a general northwest and southeast direction. Haw Creek, a stream of some considerable commercial importance, empties into the lake at its extreme southeasterly end. The outlet to the lake is, as before stated, Dunns Creek, flowing from the extreme northwesterly end. Deadwood Lake is an arm of Crescent Lake, extending for a mile or so in a northerly direction from near the mouth of Haw Creek.

The depth in the channel of the St. Johns River to and into the mouth of Dunns Creek is in excess of 10 feet, and no great expenditure would be required to provide a depth of 10 feet to Crescent City.

Nearly all of the traffic from Lake Crescent is carried by water. The area tributary to the lake is rapidly being developed and the community is already in a thriving condition. The products are mostly citrus fruits and vegetables for the early northern markets. Lumber and naval stores are produced in considerable quantities, and much timber is rafted from this locality to mills at a lower point on the St. Johns River.

The relief sought is the removal of the shoal in the lake near its outlet and two or three shoals on the west side of the lake, which prevent approach to the west shore of the lake within a reasonable distance to effect a landing.

The Beach & Miller Line operates a steamer which makes three round trips weekly between Jacksonville and Crescent City. Several other steamers make more or less regular trips from Jacksonville to points on the lake, but this office has been unable to obtain definite information as to the amount of traffic handled in this manner, which, however, is known to include naval stores and lumber to no inconsiderable amount, besides large rafts of timber destined to Palatka as well as Jacksonville. The shoal in Lake Crescent near its outlet causes serious inconvenience to this traffic.

The wharves at numerous landings on Dunns Creek and Lake Crescent are open to the free use of all.

There are no questions of water-power development connected with any proposed scheme of improvement of these waters.

3. The freight handled by the Beach & Miller Line in 1910 was as follows:

	Tons.
Building material	63½
Cigars and tobacco	8
Coal	17½
Crate material	223
Fertilizer	631
Furniture and hardware	80
Grain	322
Groceries	249
Hay	72
Lumber	2
Machinery	6½
Vegetables	97
Various fruits	4, 536
Miscellaneous merchandise	87½
Total	6, 397

4. While the commerce to be benefited is comparatively small, a correspondingly small amount of work will probably afford the relief needed, and the locality is considered worthy of improvement to a limited extent.

5. It is recommended that a survey be authorized, the estimated cost of which is $1,500.

Very respectfully,

J. R. SLATTERY,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[Second indorsement.]

WAR DEPARTMENT,
OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., December 6, 1911.

1. Respectfully forwarded to the Chief of Engineers, United States Army.

2. I concur with the district officer in his opinion that this project is sufficiently promising to justify a survey of moderate expense, and I would recommend an allotment of $1,500 for this purpose.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, December 26, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. Dunns Creek is a connecting waterway between Crescent Lake and the St. Johns River, which it enters 7 miles above Palatka. It is 8½ miles in length, about 12 feet in depth, and of navigable width. Crescent Lake is about 14 miles in length, from 1 to 3 miles in width, and carries generally a depth of about 12 feet. Crescent City is located about 8 miles above the lower or northerly end of the lake. The St. Johns River up to Dunns Creek has a navigable depth of 10 feet.

3. There is a shoal in Lake Crescent near the entrance to Dunns Creek, having a depth over it of about 6 feet. The removal of this and two or three small shoals on the west side of the lake, which prevent access to the landing at Crescent City, is the improvement contemplated and desired. The district officer states that a depth of 10 feet could be secured at small expense, and he recommends that a survey be authorized at an estimated cost of $1,500.

4. The commerce reported at Crescent City amounts to 6,397 tons. In addition to this there is some commerce at other points on the lake and its tributaries, but the amount of this does not appear to have been obtainable. If the improvement desired can be effected at a moderate cost, as believed by the district officer, and further investigation indicates that maintenance will be small, it appears that it would be advisable for the United States to undertake the work. To determine these questions, it is recommended that a survey be authorized.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 30, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Lake Crescent and Dunns Creek, Fla., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *January 2, 1912.*

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

REPORT OF SURVEY OF LAKE CRESCENT AND DUNNS CREEK, FLA.

War Department,
United States Engineer Office,
Jacksonville, Fla., July 10, 1912.

Sir: 1. In compliance with department letter of January 8, 1912, I have the honor to submit the following report on the survey authorized thereby of Lake Crescent and Dunns Creek, Fla., from the St. Johns River to Crescent City.

2. The survey was made by a party under the immediate charge of Mr. James G. Coxetter, inspector.

3. The map of the river and lake based upon this survey is submitted herewith, in separate roll, in four sheets. As will be seen from this map excellent depths of water generally prevail. The removal of the shoals and the straightening of the bends indicated between the St. Johns River and Crescent City would afford a navigable channel 10 feet deep and nowhere less than 100 feet in width. The material to be removed, as determined by borings, consists principally of a mixture of mud and sand, with, in some localities, some clay below.

4. The estimated cost of securing a 10-foot channel to Crescent City by making the cut-offs and dredging the shoals indicated, is as follows:

Dredging 209,000 cubic yards of mud and sand, at 10 cents	$20,900
Dredging 21,400 cubic yards of clay, at 20 cents	4,280
Clearing 8.4 acres, at $500 per acre	4,200
Engineering and contingencies, about 10 per cent	2,620
Total	32,000

5. An improvement such as the above would enable the Beach and Miller Line to operate a much larger boat than they do at the present time. Their business has prospered and they are very anxious to put on a larger boat, and assure me that they will take steps to secure this boat just as soon as they are assured of a channel of sufficient depth and width to operate it. The establishment of a successful line of boats between Crescent Lake and Jacksonville will be of incalculable value to this locality, assuring present settlers and prospective settlers a ready means of transportation to get their produce to market. Numerous orange groves and fine truck farms border the lake, and all indications point to a rapid development in this country within the next few years, provided the necessary transportation is available.

6. At the southern end of the lake there is an arm of the lake separated from the main body by a rather narrow deep channel, on which is located St. Johns Park. This lake has been called Dead Lake. Considerable development is going on in this locality and considerable freight would be obtained at this point of the lake. A 6-foot channel could readily be obtained as far as St. Johns Park by the removal of about 3,600 cubic yards of material from the shoal near the southern end of Crescent Lake. The channel leading to St. Johns Park is obstructed by sunken logs, the removal of which will be necessary before transportation facilities will be available for this locality.

7. Local interests also desire the removal of certain shoals on the west side of the lake, which prevent approach to the western shore of the lake. I do not believe that this work should be undertaken by the Federal Government. The work of the Federal Government

should be limited to the construction and maintenance of the main channel, leaving to private interests the construction of such channels as those referred to above.

8. On account, however, of the small cost of extending the channel to St. Johns Park and the considerable additional amount of freight that would be thus fed to the 10-foot channel from Crescent City north, I believe that this work should be done by the Federal Government. The estimated cost of this additional work is as follows:

Removal of 3,600 cubic yards of soft material, at 10 cents	$360
Removal of logs in front of St. Johns Park Landing	400
Engineering and contingencies, about 20 per cent	240
Total	1,000

9. Haw Creek empties into the southern end of Crescent Lake and with slight improvement could be made to afford a channel with depths of not less than 6 feet and 50 feet wide for the distance of about 5 miles. This creek flows through a very fine country, and already there are several extensive development schemes in progress along its course. The consideration of the improvement of this creek is not authorized under the existing law, but the creek would undoubtedly furnish a considerable amount of commerce that has not been considered in the past, and can not at the present time be set down in figures.

10. Although the present commerce as far as it is obtainable in figures is small, there seems to be a very good prospect of a rapid development in the next few years and with it a great increase in water-borne commerce. Most of this territory is entirely dependent upon water transportation, and there is little doubt but that sufficient commerce will develop within the next few years to fully warrant the undertaking of this improvement by the Federal Government. The Beach and Miller Line not only contemplate putting on a deeper draft boat drawing 8 or 9 feet as soon as they are assured of a 10-foot channel below Crescent City, but likewise desire to put on shallow draft boats running from Crescent City to St. Johns Park and other points in that vicinity. During the past year the transportation of the crops from the vicinity of St. Johns Park has been greatly hampered by the submerged logs near the landing, and until these conditions are remedied not only the establishment of regular boat lines to this point will be delayed, but likewise the development of neighboring territory.

11. In my opinion the improvement of Dunns Creek and Crescent Lake so as to provide a 10-foot channel from St. Johns River to Crescent City and a 6-foot channel from Crescent City to St. Johns Park is worthy of being undertaken by the Federal Government. The estimated cost of this work is $33,000 with $1,000 per year for maintenance.

12. These estimates are based on doing the work with the U. S. dredge *Florida*. The entire sum of $33,000 should be appropriated in a lump sum, in order that the work can be cleared up in a single trip up this stream, and also in order to afford needed relief to this section with the least delay practicable.

Very respectfully,

J. R. SLATTERY,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

War Department,
Office of Division Engineer, Southeast Division,
Savannah, Ga., July 13, 1912.

1. Respectfully forwarded to the Chief of Engineers, United States Army.
2. I agree with the district officer that this waterway is worthy of improvement to the extent proposed.

Dan C. Kingman,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

SUPPLEMENTAL REPORT ON LAKE CRESCENT AND DUNNS CREEK, FLA.

War Department,
United States Engineer Office,
Jacksonville, Fla., December 24, 1912.

From: Capt. J. R. Slattery, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Lake Crescent and Dunns Creek, Fla.

In compliance with first indorsement office of Chief of Engineers, dated December 19, 1912, on letter from the Board of Engineers, dated December 16, 1912, the following estimate is submitted of the cost of an 8-foot channel in Dunns Creek and Crescent Lake along the channel indicated by the Board of Engineers in pencil on sheet 4.

This change substitutes two short cut-offs for the one cut-off proposed by the district officer. The two cut-offs would afford a very much better channel than the single cut-off proposed by the undersigned, the only object in providing the one cut-off having been to keep down the cost of the work and at the same time afford a reasonably good channel.

The revised estimate then becomes:

Separate estimates for work in the lake and for the cut-offs with a view to securing a channel 8 feet deep.

For dredging 38,800 cubic yards sand and mud from Lake Crescent, at 12 cents..	$4,656
Engineering and contingencies, about 10 per cent	465
Total	5,121

For removing from the cut-offs 112,500 cubic yards of sand and mud, at 10 cents.	11,250
For removing 10,400 cubic yards of clay, at 20 cents	2,080
For clearing 9.4 acres, at $500	4,700
Engineering and contingencies, about 10 per cent	1,803
Total	19,833

It is recommended that the channel follow the more expensive route proposed by the Board of Engineers.

J. R. SLATTERY.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEASTERN DIVISION,
December 26, 1912.

To the CHIEF OF ENGINEERS.

I think that the modification suggested by the Board of Engineers for Rivers and Harbors in the location of the cut-off would be an advantageous one and would probably be worth the increased cost.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Jacksonville, Fla., September 4, 1912.

From: Capt. J. R. Slattery, Corps of Engineers.
To: Col. William T. Rossell, senior member, Board of Engineers.
Subject: Lake Crescent and Dunns Creek Survey.

1. In compliance with your letter dated July 22, 1912, the following additional information is furnished in regard to the proposed improvement of Dunns Creek and Crescent Lake.

(*a*) Separate estimates for work in the lake, in order to obtain a channel 10 feet deep:

For dredging 90,250 cubic yards of mud and sand from channel in Lake Crescent, at 10 cents	$9,025
Engineering and contingencies about 10 per cent	902
Total	9,927
For removing from cut-offs 118,750 cubic yards of mud and sand, at 10 cents	11,875
For removing 21,400 cubic yards of clay, at 20 cents	4,280
Clearing 8.4 acres, at $500	4,200
Engineering and contingencies about 10 per cent	2,035
Total	22,390

(*b*) Separate estimates for work in the lake and for the cut-offs, with a view to securing a channel 8 feet deep:

For dredging 38,800 cubic yards sand and mud from Lake Crescent, at 12 cents	$4,656
Engineering and contingencies about 10 per cent	465
Total	5,121
For removing from the cut-offs 99,400 cubic yards of sand and mud at 10 cents	9,940
For removing 10,400 cubic yards of clay at 20 cents	2,080
For clearing 8.4 acres at $500	4,200
Engineering and contingencies about 10 per cent	1,622
Total	17,842

(c) Types and usual dimensions of boats at present running on Dunns Creek and on the St. Johns River above Palatka.

Types and usual dimensions of boats at present running on Dunns Creek.

Name.	Draft.		Gross tonnage.	Length.	Breadth.	Depth.	Service.
	Loaded.	Light.					
	Ft. in.	*Ft. in.*		*Feet.*	*Feet.*	*Feet.*	
rescent	....	....	253	121	24	6.9	Freight and passenger propeller.
eck	4 6	2 0	96	80	20	4.9	Freight and passenger stern wheel.
cNeil	4 0	2 0	(1)	(1)	(1)	(1)	Do.
hiladelphia	8 0	6 0	189	112	22	7	Tow propeller.
omer	7 6	5 6	68	74	15	7	Do.
ary Howard	....	....	38	54	19	5	Do.

(1) About the same as the Heck.

Estimated 10 other tugs towing rafts and barges. No regular runs. Numerous gasoline towboats vary ng from 30 to 60 feet in length.

Types and dimensions of boats at present running on St. Johns River above Palatka.

Name.	Draft.		Gross tonnage.	Length.	Breadth.	Depth.	Service.
	Loaded.	Light.					
	Ft. in.	*Ft. in.*		*Feet.*	*Feet.*	*Feet.*	
ity of Jacksonville	5 0	3 0	459	160	33	6.5	Freight and passenger side wheel.
rederick De Barry	5 0	3 0	395	161	24	8	Do.
arry Lee	7 0	5 6	34	75	18	5	Freight and passenger propeller.

Information regarding boat that Beach & Miller Line proposes to ut on after improvements have been made:

Two letters and a telegram have been sent to the Beach & Miller Line asking for information in regard to their contemplated boat.[1] opies of these letters and telegram are inclosed herewith. No reply hatsoever has been received from this concern. Their failure to reply orces me to conclude that their need of a 10-foot channel is not pressng, and in view of the fact that an 8-foot channel would provide mply for most of the existing boats, a channel of the smaller dimenions is recommended.

J. R. SLATTERY.

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[1] Not printed.

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